LEGISLATIVE LIBRARY OF BRITISH COLUMBIA
3 3298 00246 9295

BRITISH COLUMBIA
MINISTRY OF FORESTS

Prince George Timber Supply Area

Rationale for Allowable Annual Cut (AAC) Determination

Effective June 1, 2002

Larry Pedersen
Chief Forester

102-06887/

Table of Contents

Objective of this document ... 1

Process, documentation, and the Mountain Pine Beetle epidemic ... 1

Description of the TSA ... 1

History of the AAC ... 2

New AAC determination ... 4

Information sources used in the AAC determination ... 4

Role and limitations of the technical information used ... 6

Statutory framework ... 6

Guiding principles for AAC determinations ... 6

The role of the base case ... 9

- Base case for the Prince George TSA ... 10

Consideration of Factors as Required by Section 8 of the *Forest Act* ... 12

- Land base contributing to timber harvesting ... 12
  - - general comments ... 12
  - - economic operability ... 12
  - - environmentally sensitive areas ... 13
  - - unmerchantable (problem) forest types ... 14
  - - deciduous stands ... 15
  - - estimates for roads, landing and trails ... 16
  - - woodlots ... 17
  - - cultural heritage resources ... 17
  - - Crown land plans ... 18
  - - cedar-hemlock stands ... 19
  - - Supply Block A ... 21
- Existing forest inventory ... 22
  - - existing stand volumes ... 22
- Expected rate of growth ... 23
  - - site productivity estimates ... 23
  - - small diameter pine ... 25
  - -use of select seed ... 25
- Expected time for forest to be re-established following harvest ... 27
  - - regeneration delay ... 27
  - - impediments to prompt regeneration ... 27
  - - not-satisfactorily restocked and immature areas, ... 28
- Silvicultural treatments to be applied ... 28
- Timber harvesting ... 28
- Integrated resource management objectives ... 28

    - cutblock adjacency/green-up ... 28
    - visually sensitive areas ... 29
    - riparian ... 29
    - identified wildlife species ... 30
    - ungulate winter range ... 31
    - caribou ... 31
    - stand-level biodiversity ... 32
    - landscape-level biodiversity ... 33
    - environmental assessment ... 35
  Land and resource management plans ... 36
  Innovative Forest Practices agreement ... 36
  First Nations considerations ... 37
  Splitting the TSA ... 39
  Alternative rates of harvest ... 39
  Community implications ... 40
  Existing mills and their requirements ... 40
  Minister's letter and memorandum ... 41
  Local objectives ... 41
  Unsalvaged losses ... 42
  Epidemic mountain pine beetle infestation ... 43
    - background ... 43
    - survey methodology and results ... 44
    - management strategies ... 45
    - timber supply forecasts ... 46
    - environmental concerns ... 48
    - public comments ... 49
Reasons for Decision ... 49
Determination ... 54
Implementation ... 54
Appendix 1: Section 8 of the *Forest Act* ... 56
Appendix 2: Section 4 of the *Ministry of Forests Act* ... 58
Appendix 3: Extract from Unger, L. 1993. Mountain Pine Beetle. Forestry Canada, Forest Insect and Disease Survey, Forest Pest Leaflet No. 76, 7p ... 59
Documents attached: ... 64
Appendix 4: Minister of Forests' letter of July 28, 1994 ... 65
Appendix 5: Minister of Forests' memo of February 26, 1996 ... 66
Appendix 6: Summary of Public Input ... 67

Objective of this document

This document provides an accounting of the factors I have considered and the rationale I have employed as chief forester of British Columbia in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for the Prince George Timber Supply Area (TSA). The document identifies where new or better information is needed for incorporation in future determinations. It also takes into account the rising mountain pine beetle epidemic occurring in the region.

Process, documentation, and the Mountain Pine Beetle epidemic

The timber supply review which led to this decision began with the preparation of the *Prince George TSA Timber Supply Review Data Package*, and its subsequent release in December 1998. In October 2001 the *Prince George TSA Analysis Report* and *Public Discussion Paper* were released. Public comments were invited, received and considered for all of these publications. On January 28-30, 2002, I met with staff from the ministries of Forests (British Columbia Forest Service (BCFS)), Sustainable Resource Management (MSRM), Water, Land and Air Protection (MWLAP), and Agriculture, Foods and Fisheries (MAFF) to review the timber supply analysis and public comments.

The analysis, conducted prior to the completion of the 2001 mountain pine beetle (MPB) survey, reported that the ongoing MPB epidemic could be managed within the current AAC. However, upon review of the MPB survey information, along with the 2001 timber supply analysis, I believed there was cause to consider increasing the AAC to address this epidemic. I subsequently directed staff to conduct an additional timber supply assessment incorporating the new information on the MPB epidemic. In doing so I also directed staff to use the most recent information for current forest management practices, the land available for timber harvesting, and timber yields. In the interests of openness and transparency, a second public discussion paper was released in March 2002 inviting public comments on a revised base case and a proposed temporary AAC increase due to the MPB. On April 30, 2002, I met with staff to review the MPB assessment and public comments received, and to finalize this determination.

Description of the TSA

The Prince George TSA is situated in the north-central interior of British Columbia and covers approximately 7.5 million hectares, making it one of the largest management units in the province. It is one of six TSAs in the Ministry of Forests' Prince George Forest Region and is jointly administered by three Forest District Offices: Prince George, Vanderhoof and Fort St. James.

The Prince George TSA stretches from almost the Alberta border at its southeast corner to Tweedsmuir Provincial Park along its southwest arm, and northwest to the Spatsizi Plateau Wilderness Park. The central and southwestern portion is fairly flat and rolling with gentle slopes, and supports forests of predominantly lodgepole pine and white spruce. The eastern part of the TSA runs along the Rocky Mountains, where spruce and subalpine fir dominate higher elevations and forests of large old western redcedar and western hemlock dominate lower elevations. The northwestern portion of the TSA is covered by the Omineca and Skeena mountain ranges. In this part of the TSA, pine dominates the valley bottoms, spruce the lower and mid slopes, and subalpine fir the upper slopes. The TSA includes the Fraser, Nechako, Stuart, Skeena, Sustut, Nation, Parsnip and McGregor river systems, as well as numerous lakes of all sizes.

Approximately 71 percent (5.33 million hectares) of the Prince George TSA land base is Crown forest land. About 62 percent of the Crown forest land (3 325 683 hectares or 44 percent of the total TSA land base) was considered available for timber harvesting in the revised base case. This timber harvesting land base is dominated by lodgepole pine stands (51 percent). The balance is made up of spruce (31 percent), subalpine fir (16 percent), Douglas-fir (1 percent), and cedar and hemlock (1 percent). A high proportion of the pine-leading stands was established 40 or more years ago following major fire disturbances. Rising populations of MPB currently threaten these mature stands. The younger stands have been planted to predominantly spruce, lodgepole pine and Douglas-fir. There are also some relatively old stands, mainly comprised of spruce and subalpine fir, in areas with higher precipitation. In addition, there are some very old cedar stands in the Interior Cedar Hemlock biogeoclimatic zone located in the eastern portion of the TSA.

The City of Prince George is the largest community in the TSA with a population of over 80,000. Other communities include Bear Lake, Fort Fraser, Fort St. James, Fraser Lake, Giscome, Hixon, McLeod Lake, Shelley, Stellaquo, Stoney Creek, Strathnaver, Tache Takla Landing, Upper Fraser, Vanderhoof, and Ye Koo Che. In 2000, the total population of the Prince George TSA was estimated to be about 109,285, which represents about a five-percent increase since the 1991 census.

Twenty First Nations groups, comprising about six percent of the Prince George TSA's population, have asserted traditional territories within the TSA. These groups include Nak'azdli, Takla Lake, Tl'azt'en, Nadleh Whut'en, Stellat'en, Saik'uz, Lheidli T'enneh, McLeod Lake, Yekooche, Cheslatta, Gitxsan, Natoot'en, Lhoosk'uz Dene, Ulkatcho, Kaska Dena, Tsay Keh Dene, Red Bluff, Lake Babine, Nazko, and Tahltan First Nations.

The forest industry is an important source of employment and income for residents of the Prince George TSA. According to a 1996 census, over 30 percent of the TSA's labour force is employed in the logging, forestry services, or forest products manufacturing sectors. In 2000, there were 27 mills operating in the Prince George TSA, including 19 lumber mills, three pulp and one paper mill, two chip mills, one pole producer, and one veneer plywood mill. Combined these mills processed over 10.8 million cubic metres of logs annually between 1998 and 2000.

History of the AAC

Since its creation in 1978, the Prince George TSAs allowable annual cut (AAC) has been redetermined several times. In 1986 the AAC was 8 605 000 cubic metres. In 1987 it was increased to 8 855 000 cubic metres to facilitate the use of small diameter pine in the Vanderhoof area. The AAC was increased again in 1988 to 9 255 000 cubic metres to encourage harvest in the Takla Sustut supply blocks. On April 1, 1989 the TSA's AAC was further increased to 9 501 093 cubic metres to reflect a minor AAC credit issued under Section 52 of the *Forest Act* and to facilitate harvest in balsam-leading stands and the salvage of spruce beetle damaged timber. Following this uplift, the minister apportioned 900 000 cubic metres of the AAC to non-replaceable forest licences.

On September 25, 1989 the TSA's AAC was reduced to 9 313 463 cubic metres to account for the creation of tree farm licence (TFL) 53. In 1991, the AAC was reduced to 9 280 499 cubic metres following the establishment of another TFL (TFL 52) and then again to 9 180 499 cubic metres following the expiry of a timber sale licence.

On January 23, 1996 the chief forester set the AAC for the Prince George TSA at 9 363 661 cubic metres. This AAC includes a partition of 290 000 cubic metres per year for harvesting cedar and hemlock stands. Of this, 250 000 cubic metres per year was to be directed to the salvage of stands heavily damaged by the hemlock looper over five years. The remaining 40 000 cubic metres was to be directed at stands with lower levels of infestation for an indefinite period of time to control future outbreaks.

The AAC is currently apportioned by the Minister of Forests as follows:

Table 1. Current Apportionment of the Prince George TSA AAC

Form of Agreement	Partition		Total m^3/year	Percent of AAC
	Conventional m^3/year	Cedar hemlock m^3/year		
Forest Licence, replaceable	6 520 459	—	6 520 459	69.6
Forest Licence, non-replaceable	733 334	290 000	1 023 334	10.9
Timber Sale Licences Replaceable (<= 10 000 m^3)	5 859	—	5 859	0.1
SBFEP[1] Forest Licence Non-replaceable	150 000	—	150 000	1.6
SBFEP Category 1 (Section 20)	712 172	—	712 172	7.6
SBFEP Category 2 (Section 20)	115 416	—	115 416	1.2
SBFEP Bid proposals (Section 21)	626 000	—	626 000	6.7
Woodlot Licences	100 000	—	100 000	1.1
Forest Service Reserve	110 421	—	110 421	1.18
Total AAC	**9 073 661**	**290 000**	**9 363 661**	**100.0**

AAC apportioned to woodlot licences is used to support new woodlot licences and to provide additional volume to existing woodlot licences. When a new woodlot licence is issued, the Crown land under the licence is removed from the TSA. A TSA's land base and AAC are adjusted by the chief forester during an AAC determination to account for changes to woodlot licences since the previous AAC determination. Woodlot licence AACs are determined and administered separately by regional and district managers.

---

[1] SBFEP= Ministry's Small Business Forest Enterprise Program. Now referred to as the Timber Sales Program.

New AAC determination

Effective, June 1, 2002 the new AAC for the Prince George TSA will be 12 244 000 cubic metres. This determination includes a partition of 110 000 cubic metres per year for cedar-hemlock stands, a new partition of 160 000 cubic metres per year for deciduous-leading stands, and a new partition of 400 000 cubic metres per year for Supply Block A located in the northwest portion of the Fort St. James Forest District. It also includes a temporary partition of 3 000 000 cubic metres per year intended to control the mountain pine beetle (MPB) infestation. This new AAC excludes all volume issued to woodlot licences since the 1996 determination. This AAC will remain in effect until a new AAC is determined, which must take place within five years of this determination.

As an integral part of this determination, staff of the BCFS will monitor and apprise the chief forester of the condition of the MPB infestation, on the understanding that, if and when required, this determination may be revisited at a date earlier than required by legislation.

Information sources used in the AAC determination

Information considered in determining the AAC for the Prince George TSA includes the following:

- *Prince George TSA Data Package and Information Report*, British Columbia Forest Service (BCFS), December 1998;
- *Prince George TSA Analysis Report* and *Public Discussion Paper*, BCFS, October 2001;
- *Prince George TSA Public Discussion Paper: Information about a proposed temporary allowable annual cut increase due to mountain pine beetles*, BCFS, March 2002;
- Prince George TSA Timber Supply Review Summary of Public Input, BCFS, May 2002;
- *Prince George TSA Rationale for AAC Determination*, BCFS, 1996;
- *Prince George TSA Timber Supply Analysis*, BCFS, January 1995;
- *Prince George TSA Socio-Economic Analysis*, 1995;
- Forest Inventory Planning file, BCFS;
- *Prince George TSA Inventory Audit*, BCFS Resource Inventory Branch, 1998;
- *Prince George TSA Inventory Audit*, BCFS Resource Inventory Branch, recompiled 2000;
- *Prince George Forest District Vegetation Resource Inventory Phase II Sampling Project*, MSRM, 2002;

- *Working Paper 37/1998, Site Index Adjustments for Old-Growth Stands Based on Paired Plots*, Nussbaum, A.F., BCFS Research Branch, 1998;
- *Site Index Adjustments for Old-growth Stands Based on Paired Plots, 1998, Ministry of Forests Research Program;*
- *Site Index Adjustments for Old-growth Stands Based on Veteran Trees, 1998, Ministry of Forests Research Program;*
- *Forest Practices Code of British Columbia Act*, consolidated to March 2001;
- *Forest Practices Code of British Columbia Act* Regulations and Amendments, current as of March 2001;
- *Forest Practices Code of British Columbia Guidebooks*, BCFS and MSRM;
- *Higher Level Plans: Policy and Procedures*, BCFS and MELP, November 1996;
- *Landscape Unit Planning Guide*, BCFS and MELP March 1999;
- *Factoring Visual Resources into Timber Supply Analyses,* BCFS March 1998;
- *Forest Practices Code Timber Supply Analysis*, 1996;
- Prince George TSA licensee Forest Development Plans;
- Major Licence Silviculture Information System records; BCFS;
- *Prince George Land and Resource Management Plan (LRMP)*, March 1999;
- *Vanderhoof Land and Resource Management Plan (LRMP)*, January 1997;
- *Fort St. James Land and Resource Management Plan (LRMP)*, March 1999;
- *Vanderhoof Crown Land Plan,* August 1984;
- *Prince George Crown Land Plan,* December 1981;
- *Robson Valley Crown Land Plan,* November 1985;
- *Arability Study* and *Agreement Regarding Agriculture Development Areas and Agricluture Land Reserve,* Fort St. James Forest District, BCFS, MELP, MAFF *et al.* - June 2000;
- *Identified Wildlife Management Strategy*, BCFS and MELP, February 1999;
- *Mountain Caribou Management Strategy, Prince George Forest District,* January 12, 1994;
- *Habitat Management Strategy for Caribou for the Vanderhoof Forest District* - October 2001;
- *Forest Health Aerial Overview Survey Standards for British Columbia,* BCFS and Canadian Forest Service, June 2000;
- *Mountain Pine Beetle: Biology & Outbreak Development;* A. Carroll, L. Safranyik, and D. Linton, Canadian Forest Service, http://www.pfc.cfs.nrcan.gc.ca/entomology/mpb/;
- Letter from the Minister of Forests to the chief forester, dated July 28, 1994, stating the Crown's economic and social objectives for the province;

- Memorandum from the Minister of Forests to the chief forester, dated February 26, 1996, stating the Crown's economic and social objectives for the province regarding visual resources;
- Technical review and evaluation of current operating conditions through comprehensive discussions with staff of the BCFS, including the AAC determination meetings held in Prince George January 28-30, 2002 and April 30, 2002.

Role and limitations of the technical information used

Section 8 of the *Forest Act* requires the chief forester to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis, and the inventory and growth and yield data used as inputs to the analysis, typically form the major body of technical information used in AAC determinations. Timber supply analyses and associated inventory information are concerned primarily with biophysical factors—such as the rate of timber growth and definition of the land base considered available for timber harvesting—and with management practices.

However, the analytical techniques used to assess timber supply are necessarily simplifications of the real world. There is uncertainty about many of the factors used as inputs to timber supply analysis due in part to variations in physical, biological and social conditions, although ongoing science-based improvements in the understanding of ecological dynamics will help reduce some of this uncertainty.

Furthermore, technical analytical methods such as computer models cannot incorporate all of the social, cultural and economic factors that are relevant when making forest management decisions. Therefore, technical information and analysis do not necessarily provide complete answers or solutions to forest management problems such as AAC determinations. The information does, however, provide valuable insight into potential impacts of different resource-use assumptions and actions, and thus forms an important component of the information required to be considered in AAC determinations.

In determining the AAC for the Prince George TSA, I have considered known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining AACs for TSAs and Tree Farm Licences (TFLs). Section 8 is reproduced in full as Appendix 1.

Guiding principles for AAC determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. In making a large number of determinations for many forest management units over extended periods of time, administrative fairness requires consistency when addressing these changes and associated uncertainties. To make my approach in these matters explicit, I have set out the following body of guiding principles. If in some specific circumstance it is necessary to deviate from these principles, I will provide a detailed reasoning in the considerations that follow.

Two important ways of dealing with uncertainty are:

(i) minimizing risk, in respect of which in making AAC determinations, I consider the uncertainty associated with the information before me, and attempt to assess the various potential current and future social, economic and environmental risks associated with a range of possible AACs; and

(ii) redetermining AACs frequently, to ensure they incorporate current information and knowledge—a principle that has been recognized in the legislated requirement to redetermine AACs every five years. The adoption of this principle is central to many of the guiding principles that follow.

In considering the various factors that Section 8 of the *Forest Act* requires me to take into account in determining AACs, I attempt to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported speculation with respect either to factors that could work to increase the timber supply—such as optimistic assumptions about harvesting in unconventional areas, or using unconventional technology, that are not substantiated by demonstrated performance—or to factors that could work to reduce the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the *Forest Practices Code of British Columbia Act* and its associated regulations (the Forest Practices Code).

The *Forest Practices Code of British Columbia Regulations* were originally approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time. The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995.

Although the Forest Practices Code has been fully implemented since the end of the transition period on June 15, 1997, the timber supply implications of some of its provisions, such as those for landscape-level biodiversity, still remain uncertain, particularly when considered in combination with other factors. In each AAC determination I take this uncertainty into account to the extent possible in context of the best available information.

The eventual timber supply impacts associated with strategic land-use decisions resulting from the various planning processes—including the Commission on Resources and Environment (CORE) process for regional plans, the Protected Areas Strategy, and Land and Resource Management Planning (LRMP) process—are often discussed in relation to current AAC determinations. Since the outcomes of these planning processes are subject to significant uncertainty before formal approval by government, it has been and continues to be my position that in determining AACs it would be inappropriate to attempt to speculate on the timber supply impacts that will eventually result from land-use decisions not yet taken by government. Thus I do not account for possible impacts of existing or anticipated recommendations made by such planning processes, nor do I attempt to anticipate any action the government could take in response to such recommendations.

Moreover, even where government has made a formal land-use decision, it may not always be possible to fully analyze and account for the consequent timber supply impacts in a current AAC determination. In many cases, government's land-use decision must be followed by a number of detailed implementation decisions. For example, a land-use decision may require the establishment of resource management zones and resource management objectives and strategies for these zones. Until such implementation decisions are made it would be impossible to fully assess the overall impacts of the land-use decision. Nevertheless, the legislated requirement for five-year AAC reviews will ensure that future determinations address ongoing plan implementation decisions.

However, where specific protected areas have been designated by legislation or by order in council, these areas are deducted from the timber harvesting land base and are no longer considered to contribute to the timber supply in AAC determinations.

In the Prince George TSA, government's approval of the Vanderhoof LRMP in 1997, and the Prince George and Fort. St. James LRMPs in 1999, and decisions on protected areas have clarified many aspects of land and resource use and management. Implementation of these LRMPs will provide further certainty regarding resource management in the area.

Forest Renewal British Columbia (FRBC) funded a number of intensive silviculture activities that have the potential to affect timber supply, particularly in the long-term. As with all components of my determinations, I require sound evidence before accounting for the effects of intensive silviculture on possible harvest levels. Nonetheless, I will consider information on the types and extent of planned and implemented practices as well as relevant scientific, empirical and analytical evidence on the likely magnitude and timing of any timber supply effects of intensive silviculture.

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete, but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency to re-determine many outdated AACs between 1992 and 1996. In any case, the data and models available today are improved from those available in the past, and will undoubtedly provide for more reliable determinations.

Others have suggested that, in view of data uncertainties, I should immediately reduce some AACs in the interest of caution. However, any AAC determination I make must be the result of applying my judgement to the available information, taking any uncertainties into account. Given the large impacts that AAC determinations can have on communities, no responsible AAC determination can be made solely on the basis of a response to uncertainty. Nevertheless, in making my determination, I may need to make allowances for risks that arise because of uncertainty.

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from recent decisions in the British Columbia Court of Appeal and the Supreme Court of Canada. The AAC that I determine should not in any way be construed as limiting the Crown's obligations under these decisions. In this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within the Prince George TSA. My determination is also independent of any decision by the Minister of Forests with respect to subsequent allocation of the wood supply.

The British Columbia Court of Appeal decided in March 2002 that pending the final determination of the existence of aboriginal rights and title, the Crown has an obligation to consult with First Nations with respect to asserted rights and title in a manner proportional to the strength of the interests. I consider any information brought forward respecting First Nations' interests. In particular I consider information related to actions taken to protect interests, including operational plans that describe forest practices designed to seek to address such First Nations' interests. In this context, I re-iterate that my AAC determination does not prescribe a particular plan of harvesting activity, nor does it involve allocation of the wood supply to any particular party.

If, subsequent to this determination, I become aware of information respecting First Nations interests that would substantially alter the estimate of timber supply underlying my determination, I may revisit my determination.

Overall, in making AAC determinations, I am mindful of the mandate of the Ministry of Forests as set out in Section 4 of the *Ministry of Forests Act* and of my responsibilities under the *Forest Practices Code of British Columbia Act* and the *Forest Act*.

The role of the base case

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the work of the Timber Supply Review program for TSAs and TFLs.

For each TSA AAC determination a timber supply analysis is carried out using an information package, which includes data and information from three categories—land base inventory, timber growth and yield, and management practices. Using this set of data and a computer model (Forest Service Simulator, or FSSIM), a series of timber supply forecasts are produced, reflecting different decline rates, starting harvest levels, and potential trade-offs between short- and long-term harvest levels.

From this range of forecasts, one that attempts to avoid excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forest lands, is chosen as the "base case". This base case forecast is used to assess and compare the effects of uncertainty on timber supply. It is not an AAC recommendation.

Because forest management is inherently a long-term undertaking, uncertainty is present in much of the information used in analysing the timber supply. Any base case thus provides only a part of the timber supply picture for a TSA, and should not be viewed in isolation from accompanying sensitivity analysis. In my determination I have considered a number of relevant sensitivity analyses in assessing particular uncertainties, as well as alternative harvest forecasts, as documented in this rationale statement.

Therefore, much of what follows in the considerations outlined below is an examination of the degree to which all the assumptions made in generating the base case forecast are realistic and current, and the degree to which its predictions of timber supply must be adjusted, if necessary, to more properly reflect the current situation.

These adjustments are made on the basis of informed judgement, using current available information about forest management, which may well have changed since the original information package was assembled. Forest management data is particularly subject to change during periods of legislative or regulatory change, such as the enactment of the Code, or during the implementation of new policies, procedures, guidelines or plans.

Thus it is important to remember, in reviewing the considerations which lead to the AAC determination, that while the timber supply analysis with which I am provided is integral to those considerations, the AAC determination itself is not a calculation but a synthesis of judgement and analysis in which numerous risks and uncertainties are weighed. Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the base case forecast. Judgements that may be based in part on uncertain information are essentially qualitative in nature and, as such, are subject to an element of risk. Consequently, once an AAC has been determined, no additional precision or validation may be gained by attempting a computer analysis of the combined considerations to confirm the exact AAC determined.

Base case for the Prince George TSA

The base case presented in the *Prince George Timber Supply Area Analysis Report*, October 2001 was derived from the best information available on current forest management, the land available for timber harvesting, and timber yields within the TSA. It also included specific assumptions related to the implementation of the Forest Practices Code, LRMPs, and other land-use policies, plans, designations and management decisions. The base case did not however reflect information derived from the 2001 MPB aerial survey.

The October 2001 Prince George TSA analysis indicated a base case harvest level of 9 073 661 cubic metres per year could be maintained for 170 years before declining by 3 percent to a long-term level of 8 800 000 cubic metres per year. Specific considerations which led to the choice of this base case forecast included establishing the initial harvest level at the previous AAC of 9 363 661cubic metres, less 290 000 cubic metres for looper damaged cedar-hemlock stands, less 100 000 cubic metres for woodlot licences issued since the last determination, and plus 100 000 cubic metres for the sustainable harvest of cedar-hemlock stands.

The base case was net of non-recoverable losses (excluding losses attributed to the MPB epidemic) and did not include deciduous-leading stands. The analysis also provided for an orderly transition of harvests from older natural stands to future managed stands.

Upon review of the original base case I concluded that some of the general management assumptions used should be revised or updated in order to adequately assess the timber supply implications of the MPB epidemic. I subsequently instructed staff to revise the base case to reflect new information on the forest management practices, the timber harvesting land base, and forest productivity.

The revised base case, as reported in the March 2002 public discussion paper, indicated that a harvest flow of 9 083 661 cubic metres per year could be maintained for 35 years before declining to a long-term level of 8 684 000 cubic metres per year in 65 years. The revised short-term harvest forecast included a sustainable harvest rate of 110 000 cubic metres per year from cedar-hemlock stands.

I have considered the reasoning used to select the original and revised base cases and I am satisfied that they provide a suitable basis from which to evaluate the assumptions regarding the land base, management practices, timber yields and the MPB epidemic in the Prince George TSA.

In determining the AAC for the Prince George TSA I have relied in part on the original and revised base case timber supply projections, and several related forecasts, and assessed the validity of the assumptions incorporated in those projections. I also relied on analyses incorporating combinations of changed assumptions, and on sensitivity analyses applied to the short-and long-term harvest flow projections. In particular, I considered a number of management responses to the rapid expansion of the MPB. These are discussed in further detail in the section titled Epidemic mountain pine beetle infestation.

I have also considered all public input received on the data package, analysis report, and public discussion papers, and, where appropriate, I have discussed my considerations under the various factors presented in this rationale.

In this rationale statement I discuss many of the assumptions I considered in making my determination. However, where I was satisfied that an assumption was appropriately modelled in the original base case, and subsequently the revised base case, I do not discuss my consideration of that assumption in detail.

Consideration of Factors as Required by Section 8 of the *Forest Act*

Section 8 (8)

In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

I have considered information related to the derivation of the timber harvesting land base (THLB), the existing inventory, and the expected rates of growth for the Prince George TSA. Where my consideration of the information has identified a factor which in my estimation requires discussion in this document, it is described below. Based on my thorough review, I accept the assumptions used in the analysis for *physically inoperable areas, timber licence reversion,* and *minimum harvest ages.* Consequently, these factors are not discussed below.

Land base contributing to timber harvesting

- general comments

The THLB is the productive Crown forest land area less deductions made for ecological, economic or social reasons. Accounting for these factors effectively reduces the suitability or availability of the productive forest land area for harvest. As reported in the *Prince George TSA Analysis Report,* October 2001, the THLB of the Prince George TSA, after deductions, was estimated to be 3 388 145 hectares, or approximately 64 percent of the productive Crown forest area. This estimate was slightly reduced to 3 325 683 hectares, or approximately 62 percent of the productive Crown forest area, following incorporation of new information in establishing a revised base case. I have referred to the changes made to the assumptions regarding the THLB, subsequent to those reported in the October 2001 analysis report, under the applicable factors considered in this rationale.

- economic operability

Economic operability is estimated by evaluating the terrain, access, and the quality and volume of timber for an area, in conjunction with current harvesting technology and markets. In my last determination I instructed BCFS staff to re-evaluate the economic criteria used for this factor as technology and market forces change. Assessment of economic operability for this timber supply review was subsequently refined using harvest system mapping, which is based on physical terrain and soil types.

The minimum volume per hectare threshold for economic viability was estimated to be 140 cubic metres per hectare for conventional (ground-based) operating areas, 200 cubic metres per hectare for mixed conventional and cable/helicopter terrain, and 250 cubic metres for cable/helicopter terrain. Remote and high-cost areas, which were not accounted for by other reductions, were removed from the THLB as well. As a result of the order in which deductions to the THLB were applied, a total of 281 026 hectares were excluded for economic inoperability reasons and 3645 hectares were also excluded for isolated high-cost areas. In the revised base case these figures were adjusted to 315 058 hectares and 3504 hectares, respectively.

Public input indicated that more areas should have been considered uneconomic in consideration of poor market conditions and projections. Licensees, however, suggested that some lower volume stands should not have been excluded from the THLB as recent equipment modifications have made them economically operable.

Though recent changes in market and technology have been used to challenge the assumptions used in the analysis, these assertions need to be proven out over a few economic cycles and following anticipated changes to the provincial stumpage system. For these reasons I do not believe that revisiting the assessment for economic operability is warranted at this time.

The economic operability assessment conducted represents a significant improvement over the previous assessment as uneconomic areas were geographically identified, and reflective of recent practices and market trends. In conclusion, I am satisfied that the criteria used for economic operability are adequate for use in this determination.

- environmentally sensitive areas

Environmentally sensitive areas (ESA) are areas with sensitivity to disturbance and/or significant values for fisheries, recreation, water or wildlife. ESA values are used to exclude areas from the THLB where more specific and detailed information about a particular forest resource is not available. For example, some ESAs serve as proxies for mule deer winter range identified in the Cariboo Chilcotin Land Use Plan (which overlaps the southern portion of the Prince George TSA) and which were not considered elsewhere in the analysis. ESAs are categorized by type of sensitivity and are further classified as being either highly or moderately sensitive to disturbance or of significance to non-timber values. ESAs may be entirely or partially excluded from the THLB according to their respective categories.

In total, 446 920 hectares were excluded from the THLB for ESAs in the original and revised base cases. ESA categories considered in the timber supply analysis included recreation, soils, wildlife, and forest management and regeneration problems. Deductions made for these ESAs were based on estimated harvesting restrictions by category and district. For example, 80 percent of the total area classified with highly sensitive soils in the Prince George and Vanderhoof Forest Districts, and 90 percent in Fort St. James District was excluded. For areas with more than one ESA classification, the ESA with the highest reduction was applied.

The percentage reductions for recreation high and wildlife high ESAs were significantly lower in the Vanderhoof Forest District as compared with the Prince George and Fort St. James Districts. This difference reflects the fact that the Vanderhoof Forest District has a higher proportion of area classified as highly sensitive sites, and differences in mapping techniques used by the respective districts. Soil and regeneration problem ESAs in Prince

George District were updated in 1999 but not in time to be used for this analysis. Based on a comparison of new and old classifications, district staff do not believe there would be any significant changes to deductions due to this new information.

Licensees suggested that ESA deductions made in the previous determination overlapped with other deductions, and that site specific information gathered since 1995 better identifies areas for protection and constrained management. They suggest that the size of the THLB may therefore be underestimated due to possible double counting. Licensees also recommended that soil, recreation, wildlife, and other ESAs with a harvesting history, be included in the THLB.

Having reviewed the assumptions made for this and other assessments, and in consideration of the sequential deduction process used in deriving the THLB, I am satisfied that areas deducted for ESAs were not double-counted. I also believe that the use of ESAs as proxies for other values is appropriate in the absence of better information available at this time. I therefore believe it is appropriate to reduce the THLB in consideration of ESAs, including the exclusion of soil, recreation, wildlife, and other ESAs with a harvesting history.

I am satisfied that the assumptions used in this assessment represent the best available information. I do however encourage BCFS and MWLAP staff to examine the differences in ESA percent reductions between districts prior to the next timber supply review.

- unmerchantable (problem) forest types

Problem forest types are stands that are physically operable but are not currently utilized or have marginal merchantability. In total, 317 076 hectares of mature and 45 636 hectares of immature unmerchantable stands were removed from the THLB in the original Prince George TSA analysis. The mature area estimate changed to 316 105 hectares and the immature area estimate remained unchanged in the revised base case. Unmerchantable mature forest types were defined as stands or sites with non-commercial species, insufficient stocking, insufficient height, or a combination of these attributes. Deciduous-leading stands, which are not currently being harvested in any significant volume, were included in this category. Unmerchantable immature stands were defined as low productivity sites not predicted to meet a minimum harvest volume threshold by a defined age. The immature stand volume thresholds were predicted using naturally regenerated stand site indices. Some of these stands however may perform like more productive managed second-growth stands. Increased productivity from rehabilitating some of the immature stands was not considered. Balsam-leading stands in the Fort St. James District, amounting to over 200 000 hectares, were retained in the THLB even though they are considered economically marginal. I will discuss and consider these stands further under 'Supply Block A'.

I consider the assumptions used to define and exclude problem forest types to reasonably reflect stand productivity, current practices and operating thresholds. I encourage staff to continue monitoring the merchantability of immature stands in consideration of possible future site rehabilitation work, and revisions to forest policy and inventory data.

- deciduous stands

Deciduous stands are those forest stands dominated by deciduous broad leaf species, such as aspen and birch. To date, utilization of these stands in the Prince George TSA has been very limited, though several expressions of interest for aspen-based tenures have been submitted over the past two years. The Small Business Forest Enterprise Program also recently issued licences for approximately 30 000 cubic metres from birch-leading stands primarily in the Prince George District. Because of this interest, and in accordance with instructions in my last determination, I requested that staff analyse the deciduous timber supply.

The Prince George TSA inventory file identified approximately 192 000 hectares of aspen-leading stands and 28 800 hectares of birch-leading stands. These deciduous-leading stands were not included in the base case analyses, though the minor aspen component of coniferous-leading stands was included in the base case THLB. Separate analyses for the deciduous-leading stands, aspen and birch respectively, were undertaken during the timber supply review.

The THLB for aspen was estimated by applying the same criteria to the total aspen-leading area as were applied to the coniferous-leading land base. Economically operable stands were identified using the same criteria as used in the Fort Nelson TSA timber supply review, where merchantable aspen-leading stands were defined as having a site index of 17.7 or greater. The potential THLB for aspen-leading stands in the Prince George TSA was estimated to be 61 700 hectares using these criteria. The analysis indicated this area could support a harvest rate of 145 000 cubic metres per year for three decades before decreasing over the next four decades to a long-term harvest level of 95 000 cubic metres. The analysis was sensitive to site index selection. Lowering the minimum site index from 17.7 to 17.0 increases the aspen-leading THLB, which in turn extends the projected short-term harvest period and increases the long-term harvest level.

Birch is a short-lived species commonly subject to damage and rot. Using the same criteria as for aspen, the potential THLB for birch was estimated to be 13 800 hectares, the majority of which is located in the Prince George District. Based on conservative volume estimates for birch stands, this area could provide a harvest flow of 15 000 to 25 000 cubic metres per year in both the short- and long-term.

Licensees indicated that the majority of aspen-leading stands will convert to coniferous-leading stands over time. The licensees recommended that 50 percent of the aspen-conifer stands at age 120 years be converted to coniferous-leading stands at 80 years of age. Although I agree with the licensees' assumptions about stand succession, such changes are best reflected in future revisions to the inventory data base.

Ainsworth Lumber Co. also expressed interest in securing a deciduous tenure in the Prince George TSA to support their oriented stand board facility in 100 Mile House. Their research on deciduous resource location and merchantability indicates a higher long-term deciduous harvest level could be maintained and that development of this resource is operationally and economically viable. I would also like it to be known that I met with

Ainsworth representatives in the fall of 2001 to discuss their interests and their information regarding the deciduous resource. I cannot however, through this determination or any other means, affect a tenure award decision to favour this or any other company. The advertisement and issuance of all forest tenures must be made in accordance with the *Forest Act*.

I have reviewed the information about deciduous-leading stands in the Prince George TSA. Although there has been a limited amount of demonstrated performance in deciduous-leading stands to date, advances in technology have improved the economics of utilizing these species. I therefore believe it is appropriate and timely to consider the use of this resource.

I believe the assumptions used in the sensitivity analyses were adequate for the purposes of this determination. I am satisfied that it is appropriate to establish a deciduous partition of 160 000 cubic metres per year, consisting of 145 000 cubic metres per year derived from aspen-leading stands and 15 000 cubic metres per year from birch-leading stands. The large land base of the Prince George TSA and selection of a relatively high minimum site index to identify merchantable deciduous stands leads me to believe that environmental and other important values will be not be compromised at this moderate level of activity. Licensee interest and operational experience in these stands, and further assessment of successional patterns will help to confirm or refine the appropriate harvest level for deciduous-leading stands in the next determination. I will discuss my considerations for this decision further in my 'Reasons for Decision'.

- estimates for roads, landing and trails

In the analysis, a percentage of productive forest land was excluded for permanent losses due to the construction of roads, landings and trails. Estimates were made for existing structures both within and between harvested areas. Estimates were also made for future structures to reflect expansion of the road networks over time. These estimates were based on ground surveys, information (circa 1996) from the Integrated Silviculture Information System (ISIS) and the Major Licensee Information System (MLSIS) and advice from district engineers.

A total of 20 759 hectares was deducted from the original THLB to account for existing roads, lands and trails. This was revised to 20 759 hectares, or 0.6 percent of the THLB, in the revised timber supply forecast. An additional 149 438 hectares were removed from the THLB in the original base case, and 146 683 hectares in the revised base case, to account for future road, landing and trail construction. These reductions were applied after stands were harvested for the first time.

Licensees indicated that reductions made for roads, trails and landings in the analysis reflected construction practices of the 1970's and 1980's. They indicated that roadside logging, road rehabilitation, and varying right-of-way width practices in the 1990's have reduced permanent losses to the THLB. I agree that a better refinement of this analysis might support the licensees' assertions. However, an assessment of which methodology provides better estimates for road, landing and trail losses is first required.

The deductions made for losses due to roads, trails and landings in this analysis do not appear to be extraordinarily high in comparison with deductions made in timber supply reviews for other interior management units. I have no other quantitative evidence to dispute the methods and deductions used in this analysis. The most important issue for this determination is the deduction made for existing roads, trails and landings, which reflect practices in the 1990s and earlier. Therefore, I believe the assumptions presented in the analysis reasonably reflect current practice. I encourage staff and licensees, subject to availability of time, resources and complexity, to assess the use of geographic information systems (GIS), or other means, to reduce the uncertainty of road, landing and trail reductions in the next timber supply review.

- woodlots

The *Forest Act* requires that I determine the AAC for the Crown land in each TSA, excluding tree farm licence areas and woodlot licence areas. Initially, the area and harvest level of Crown land issued under woodlot licences is derived from a TSA and its AAC apportioned to woodlot licences by the minister, respectively. Once a woodlot licence is issued or increased in size, its associated Crown land is removed from the TSA land base. Conversely, if a woodlot licence is cancelled, the Crown land under it reverts to the TSA. In my AAC determinations I take into account the minister's apportionment and woodlot licences actually issued, cancelled and adjusted since my previous determination.

Following my previous determination the minister apportioned 100 000 cubic metres of the TSA's AAC to woodlot licences. This volume was subsequently allocated to new woodlot licences and woodlot licence "top-ups". In the 2001 timber supply analysis, the THLB was reduced by 67 635 hectares to account for woodlot licences and tops-ups issued since my last determination, and some woodlots that were issued just prior to, and not considered in, my last determination.

I have reviewed the information presented about woodlot licences in the Prince George TSA. I am satisfied that the area removed for woodlot licences is reasonable and the THLB and base case harvest level appropriately reflect the area and harvest level attributable to the TSA.

- cultural heritage resources

Cultural heritage resources identified in the Prince George TSA include two heritage trails designated under the *Heritage Conservation Act*, five pre-1846 aboriginal trails, and some historical trails. In the original and revised analysis, 2030 hectares were deducted from the THLB to account for timber harvest buffer and exclusion zones imposed along the first two types of trails. Culturally modified trees (CMT) are emerging as an important resource. CMTs are usually noted and recorded prior to harvest, or preserved within protected trail corridors or wildlife tree patches so their impact on timber supply is difficult to assess at this time. As archaeological impact assessments (AIA) and CMT survey data in the Prince George TSA become available, assessment of any implications that these cultural heritage resources have on timber supply will become clearer. I am satisfied that the analysis reflects current practices and the best available information respecting cultural heritage resources. My acceptance of these assumptions does not however abrogate government from its fiduciary responsibilities respecting aboriginal rights and title.

- Crown land plans

Crown land plans (CLPs) are sub-regional plans jointly developed by provincial government agencies and local governments to coordinate the development and use of Crown lands and to reduce potential conflicts between competing interests. CLPs identify land-use designations for Crown land both within and outside the provincial forest. In the Prince George area, some CLP land-use designations (such as agriculture development areas, settlement reserve areas, recreation, wildlife habitat, natural environment areas, and community leases and licences) are considered to not be compatible with forest management activities.

CLP areas not considered to be compatible with the commercial production of timber were excluded from the Prince George TSA THLB during the timber supply analyses. In the original analysis a total of 50 344 hectares were deleted in consideration of land-use designations identified in the Prince George, Robson Valley, Vanderhoof and Fort St. James CLPs. This figure was revised to 50 216 hectares in establishing the revised base case.

MAFF staff indicated that soil inventory studies, completed in 1999 in accordance with the Vanderhoof LRMP, identified an additional 8470 hectares of land suitable for agriculture purposes. These areas were subsequently designated as agriculture development areas in the Vanderhoof CLP and removed from the Provincial Forest. This change in designation was not accounted for in the timber supply analyses. In 2002, an additional 5050 hectares of Crown land were zoned for non-forestry uses (2218 hectares for agriculture and 2832 hectares for wildlife management) under the Fort St. James CLP. These zonation changes were also not taken into account in establishing the original and revised THLB. These recent CLP land-use designations total 13 520 hectares, representing 0.4 percent of the THLB.

Licensees suggested that studies should be conducted to confirm or deny the arability of lands designated for agriculture purposes, and that areas already identified as poor or marginal agriculture land be included in the THLB. Licensees further recommended that all CLP areas should be included in the THLB until such time as they are scheduled for development under that plan.

Land-use designations made under CLPs do not change the legal status of the Crown land. The status of Crown land, and exclusion of timber harvesting activities, may only be changed through legislation, such as the *Lands Act* and *Parks Act* or higher level plans approved in accordance with the *Forest Practices Code of British Columbia Act*.

Harvest authorities may therefore be issued under the *Forest Act* for non-legally protected Crown land identified under a CLP, regardless of its land-use designation or whether or not it is in the Provincial Forest, subject to the requirements of the *Forest Practices Code of British Columbia Act* and other provincial statutes. Consequently, unless land has been legally deleted or protected for the purposes of the *Forest Act*, I am not required to consider these deletions or designations in my AAC determinations made under Section 8 of the *Forest Act*.

I am however mindful that district and regional managers can declare that their approvals pursuant to Section 41 of the *Forest Practices Code of British Columbia Act* will consider the contents of a particular planning document. District managers in the Prince George TSA have also reported that their approval of forest development plans appear to be consistent with the objectives expressed in the local CLPs. However, timber harvesting can and does occur on CLP areas designated as not being compatible with forestry operations. These areas therefore do contribute to the harvest of the TSA. While I recognize CLPs act as constraint on the THLB, I do not believe that areas identified under them should be removed from the THLB.

For consistency with my stated guiding principle, I must consider these CLP areas as contributing to the THLB and timber supply, until their legal status is changed under the appropriate legislation. For this determination, I conclude the timber supply has been underestimated by an unquantified amount in consideration of CLPs and will discuss this matter further under 'Reasons for Decision'.

- cedar-hemlock stands

Cedar-hemlock stands are those stands of the interior cedar hemlock (ICH) biogeoclimatic zone in the eastern portion of the Prince George TSA. These stands amount to 73 600 hectares or approximately one percent of the TSA's productive forest land base. In my last determination I established an AAC partition of 290 000 cubic metres per year to facilitate the harvest of looper-damaged timber from these cedar- and hemlock-leading stands. Of this volume only 110 000 cubic metres have been issued or offered through non-replaceable licences. Interest in the remaining timber volume has been limited due to marginal quality and poor markets. Surveys conducted subsequent to my last determination have also revealed that many of the cedar-leading stands have recovered from the looper outbreak.

In the original timber supply analysis, approximately 37 900 hectares of cedar- and hemlock-leading stands were considered unsuitable for harvesting due to economic and physical inoperability and environmental constraints. The remaining 35 700 hectares were included in the THLB. The original base case indicated that this area could support an AAC of 100 000 cubic metres for five decades before declining to 85 000 cubic metres by decade seven.

Considerable public input was received concerning these cedar-hemlock stands. Many of these submissions described these stands as being ecologically significant as they represent one of the few remaining inland rainforests in the world. Concern was expressed that many of these "antique" cedar-leading stands, some of which may have not experienced disturbance for thousands of years, would be lost over time due to harvesting activities. A number of persons suggested that until more is known about these ecosystems they should be excluded from the THLB.

Public concern was also expressed about the practice of converting cedar- and hemlock-stands to spruce-leading stands, citing a number of ecological and forest management implications. Questions were also raised about the assumptions used for wildlife tree patch retention, regeneration, operable land base, and volume estimates used in the analysis report and the revised harvest forecast. For example, one licensee indicated that it only recovers between 270 to 290 cubic metres per hectare and not 400 cubic metres per hectare assumed in the timber supply analyses. Comments were also submitted on wood quality, forest health, and protection measures in the ICH. These comments are summarized in the attached *Summary of Public Input.*

Because of the considerable public input received and to better familiarize myself with the issues particular to these stands, I invited a panel of experts to present overviews of their research in the ICH to me on January 28, 2002. These presentations on disturbance patterns and fire history, vegetation, lichens, wildlife habitat, and harvesting trials increased my appreciation of the efforts being undertaken to improve our understanding of this ecosystem's unique features and values. The old ICH forests appear to contain rare and sensitive species such as cyanolichens. The preliminary findings of this research also supports the concerns raised by the public. There are however a number of information gaps that remain to be resolved.

I have considered all the assessment assumptions and the written and verbal comments submitted regarding the ICH stands. Though I value and appreciate all the submissions made, I will not be able to respond to them individually within the scope of this determination. I will however, where appropriate, make some observations below and in my 'Reasons for Decision' to ensure that the concerns and issues raised are not discounted or overlooked.

In consideration of the above, I requested staff revise the base case harvest forecasts to reflect current commitments and better information regarding forest management practices in the ICH. Wildlife tree patch (WTP) retention was increased from 3.5 percent to 20 percent of the cutblock area. Silviculture assumptions were also revised to better reflect the profile of species now being planted and managed in these stands. Spruce regeneration in cedar-leading and hemlock-leading stands was reduced from 85 percent and 95 percent to 40 percent and 20 percent, respectively. Increased emphasis and management for cedar and hemlock, through planting and natural regeneration respectively, accounts for this revised assumption. The revised forecast for cedar-hemlock stands indicated that a harvest level of 110 000 cubic metres per year could be maintained for 70 years before declining to a long-term level of 60 000 cubic metres per year. One sensitivity analysis indicated that if the harvest recovery were reduced by 25 percent, the short-term harvest level of 110 000 cubic metres per year could be maintained for 40 years before declining to a long-term level of 46 000 cubic metres per year.

I accept the assumptions used in the revised forecast to reflect the best information available, but I also recognize that a number of uncertainties exist. Volume recoveries and the revised 20 percent WTP retention may be overestimated, which would put a downward and upward pressure on the timber supply forecast, respectively. Protection of several rare biogeoclimatic site series may be required beyond that currently provided and modelled in the base cases. None-the-less, in consideration of the assumptions, forest management objectives, and environmental values of these forests, I have decided to retain the cedar-hemlock partition with an AAC of 110 000 cubic metres. I believe this volume can be sustained in the short-term, providing a balance of economic and environmental values without placing any rare features of these stands at risk. Further considerations are presented in my 'Reasons for Decision'.

I encourage staff to complete landscape unit planning objectives for the ICH to ensure that rare biogeoclimatic sites series are identified and protected in OGMAs. I also encourage and support the on-going research being conducted in the ICH. This research will help improve forest management policies and practices, which can be reflected in future timber supply analyses.

- Supply Block A

Supply Block A is located in upper Northwest reach of the Fort St. James Forest District. This remote area is primarily undeveloped and is only accessible by air and rail. Supply Block A is over 1 million hectares in area, 17 percent of which is included in the THLB. Sub-alpine fir is the dominant species in this area, the majority of which is mature (greater than 140 years of age) and highly susceptible to pathogens. The forest inventory indicates that the total mature volume within Supply Block A is 45.6 million cubic metres, which represents 6.9 percent of the total mature volume on the THLB.

In 1988, the Prince George TSA AAC was increased by 400 000 cubic metres to facilitate the development of Supply Blocks A and B (the latter located just south of the former). Two non-replaceable forest licences were subsequently issued specifically for these blocks. These two licensees are obligated to harvest 180 000 and 192 000 cubic metres per year, respectively from Supply Blocks A and B. In recent years these licences have harvested approximately 200 000 cubic metres per year from Supply Block A. Most other licensees in the TSA have been reluctant to commence harvesting operations in Supply Block A because of high operating costs and marginal economic returns.

In the original base case timber supply forecast, Supply Block A contributed 2.3 million cubic metres per year in the first decade before falling to 690 000 cubic metres per year over the next twenty years and then achieving an 250-year average harvest of 333 585 cubic metres per year. A sensitivity analysis indicated that the harvest from Supply Block A could be held at 600 000 cubic metres per year for the first three decades with no effect on the base case forecast. Another sensitivity analysis indicated if Supply Block A were removed from the TSA's THLB, the timber supply forecast would remain unchanged during the first five decades and then decrease to a long-term harvest level of 8 490 000 cubic metres in the sixth decade.

In consideration of the high operating costs and sporadic harvest history, the Regional District of Kitimat-Stikine and the Carrier Sekani Tribal Council suggested that Supply Block A should not be included in the Prince George TSA timber supply analysis. A public comment also suggested that timber in Supply Block A would be more economic and attractive to licensees in the Prince Rupert Region if the road access was developed into this region. Prince George TSA licensees acknowledged the limited activity in Supply Block A, but recommended that it continue to contribute to the TSA's AAC. Licensees further recommended decisions concerning the future of Supply Block A be delayed until the impacts of the mountain pine and spruce beetle epidemics are known. In addition to these public comments, I have also reviewed and considered the correspondence between the regional manager and the Prince George TSA licensees over the past several years concerning Supply Block A.

I believe that it is reasonable to avoid concentrating the timber harvest outside Supply Block A if it contributes to THLB. While I recognize that the exclusion of Supply Block A would not effect the TSA's timber supply over the next few decades, harvesting in this area is required to control and salvage losses due to the MPB. Given all of the above information and in consideration of the limited harvesting performance and the questionable economic operability of Supply Block A, I am satisfied that it is appropriate to partition this area in my determination. I will therefore establish a 400 000 cubic metres per year partition for Supply Block A and will discuss my considerations for this further under 'Reasons for Decision'.

Existing forest inventory

The heights, stocking and ages on forest inventory file used for the timber supply analysis were projected to 1997. The file also accounts for harvesting activities and disturbances, such as fire and insect damage that occurred up to 1995. Though disturbance information between 1996 and 1997 was not included in the inventory assessment I consider the information used in this assessment, subject to my comments on existing stand volumes, to be satisfactory.

- existing stand volumes

Volumes for stands greater than 10 years of age were estimated and projected using forest inventory attributes and the Variable Density Yield Prediction (VDYP) model that was developed by the BCFS Resources Inventory Branch (now MSRM Terrestrial Information Branch).

Inventory audits of the inventory data for the Prince George TSA were completed in 1996-97 and 2000. The results of these audits indicate that spruce volumes in the Prince George Forest District may be overestimated by as much as 22 percent. Several sensitivity analyses were conducted to assess the impacts of these audit findings. These analyses, summarized in the original analysis report, indicated that the mid- and long-term base case harvest forecasts may be overestimated, but no short-term reduction would be required.

Licensees expressed concern about using the audit findings to make adjustments to the inventory. I acknowledge that there is uncertainty associated with the audit findings, however, there is a risk to the timber supply if existing stand volumes are overestimated by using the existing inventory file to the extent suggested by the audits. Since the conclusions of these independent audits are consistent, I do not believe that conducting more surveys will produce more definitive results.

Uncertainty in the original analysis indicated to me there was some risk to the short- and long-term timber supply. Adjustments to volume estimates were required to reflect the audit findings. I therefore requested staff to account for this information in revising the base case for the proposed MPB uplift discussed latter in this document. I am satisfied this factor was adequately accounted for in the revised base case analysis and therefore will not discuss my considerations for this any further.

Some stands greater than 10 years of age in the Prince George TSA are, or have attributes similar to, managed stands. The volume associated with these stands may therefore be underestimated by using VDYP instead of TIPSY, which is used to estimate managed stand volume. This represents an unquantified underestimation of the long-term timber supply. This consideration was not accounted for in the revised base case so I will discuss this in my 'Reasons for Decision'.

Expected rate of growth

- site productivity estimates

Inventory data includes estimates of site productivity for each forest stand. Site productivity is expressed in terms of a site index, which is based on the stand's height as a function of its age. The productivity of a site largely determines how quickly trees grow, which in turn affects the time seedlings will take to reach green-up conditions, the volume of timber that can be produced, and the age at which a stand will reach a merchantable size.

Site index values for the Prince George TSA were taken directly from the forest inventory file and used to project volume yield estimates for the THLB. Two operational adjustment factors (OAFs), based on provincial averages, were applied to the projected yields of managed stands to account for losses experienced in operational conditions. A 15 percent reduction was applied for OAF 1 factors, such as small stand openings, that affect yield curves across all ages. An additional five percent reduction was applied for OAF 2 factors, such as decay waste and breakage, whose impacts increase over time and whose influence may be reduced through management practices.

Licensees suggested that the provincial average OAF 1 reduction of 15 percent is too high for the central interior. They requested that this be reviewed for the next timber supply analysis. I agree that future timber supply analyses would benefit by using more local information and I encourage licensees to undertake the necessary and appropriate surveys required to provide more reliable estimates for OAFs in the Prince George TSA.

In general, in British Columbia, site indices determined from younger stands (i.e., less than 31 years old), and older stands (i.e., over 150 years old) may not accurately reflect potential site productivity. In young stands, growth often depends as much on recent weather, stocking density and competition from other vegetation, as it does on site quality. In old stands, which have not been subject to management of stocking density, the trees used to measure site productivity may have grown under intense competition or may have been damaged, and therefore may not reflect the true growing potential of the site. This has been verified in several areas of the province where studies — such as the site index adjustments for old-growth stands based on paired plots and veteran trees (OGSI), and research correlating results from Site Index with the Biogeoclimatic Ecosystem Classification System (SIBEC) — suggest that actual site indices may be higher than those indicated by existing data from old-growth forests. Such studies indicate that site productivity has generally been underestimated by the inventory file data; managed stands tend to grow faster than projected by inventory-based site index estimates from old-growth stands.

Licensees in the Prince George TSA recommended that site productivity be adjusted to reflect OGSI or SIBEC studies and that these adjustments be incorporated into the base case. However, until local OGSI adjustment data or site series mapping becomes available, I believe the potential effects of site index corrections are best assessed through sensitivity analyses.

In accordance with my instructions from the previous determination, and for the reasons explained above, staff used a sensitivity analysis to assess the impact to timber supply if site productivity is underestimated to the extent suggested by the OGSI studies. Site indices were adjusted accordingly for lodgepole pine and interior spruce-leading stands, as were minimum harvest and green-up ages. An individual public submission requested that sub-alpine fir site indices also be adjusted, but unfortunately OGSI adjustment data for this species does not yet exist.

This sensitivity analysis indicated that the timber supply could be as much as 13 percent greater in the short-term and up to 16.5 percent greater in the long-term than the levels projected in the base case. These projections are predicated on stands achieving their full potential through the application of silviculture treatments intended to minimize the impact of pests and competing vegetation.

While I acknowledge that there is uncertainty related to the ultimate performance of stands relative to their potential, data from the OGSI paired-plot study clearly demonstrates that actual stands are growing at a much faster rate than would be expected based on measurements from the standing old-growth inventory. Given existing silvicultural requirements, it is reasonable to expect that full stocking will occur in the majority of managed stands in the Prince George TSA, and that the stands will be managed to minimize losses to pests and competing vegetation. Therefore, while the exact magnitude of the productivity increase is not certain, I believe it is highly reasonable to expect that most second-growth stands will grow more quickly than productivity estimates based on site index values derived from old-growth stands would suggest. In this determination, I am prepared to take into account the implications of this underestimation for timber supply. I expect that timber supply in the short- to long-term is greater than projected in the original and revised base cases on this account, and I will discuss my considerations of this further under Epidemic mountain pine beetle infestation and 'Reasons for Decision'.

I note that local data will provide much needed certainty around the magnitude of site productivity adjustments appropriate for the Prince George TSA, and I strongly encourage the collection of data from stands within the TSA over the term of this determination.

- small diameter pine

In my last determination I requested that staff review the management objectives and site productivity of small diameter pine stands. I also requested that the range of merchantability and lower limits for the development of these stands be examined. Based on current knowledge concerning height growth repression, it is assumed that future rotation yields from these stands will be similar to the range of yields from other pine-leading stands. The original and revised base cases therefore assumed higher site indices for these stands after the first harvest than those currently reflected in the inventory file. Management and development objectives for these stands are being adequately addressed through a non-replaceable forest licence issued specifically for small diameter pine. I accept the assumptions used for this assessment and conclude that they present no risk to the timber supply forecasts.

-use of select seed

The Forest Practices Code requires that the best genetic quality seed source available be used for reforestation. Better genetic quality (select) seed can be collected from superior natural stand provenances and seed orchards. Select seed sources are determined or developed through field trials, which are designed to identify naturally-occurring, broadly-adapted, healthy and vigorous trees capable of passing on their desirable genes. No genetic engineering is involved in these activities.

A submission from the regional MWLAP office expressed concern over the use of genetically improved seed, stating that it could result in a loss of natural genetic diversity. Because this could be undesirable from an ecological and biodiversity perspective, MWLAP suggested that the implications of select seed use should be seriously examined.

Results of forest genetics research conducted by the BCFS over the past 40 years assure me that genetic diversity of our forests is not being compromised through the use of select seed. Studies have shown that trees in naturally regenerated stands can have high levels of relatedness. Seed orchards on the other hand consist of genetically unrelated individuals originating from stands located too far apart to cross-pollinate. Bringing these unrelated trees together in an orchard can therefore actually increase genetic diversity. Forest Practices Code requirements governing the production, registration and use of select seed also ensures that plantations contain appropriate levels of genetic diversity. In consideration of these requirements, the maintenance of *in situ* and *ex situ* gene conservation reserves, and the enormous amount of diversity present in forest stands across the landscape, I am confident that our forests are not exposed to any risks from use of select seed from an ecological or biodiversity perspective.

A stand established from select seed can yield greater volumes at a given age than if it were established using locally collected seed. The genetic gain of select seed is measured and expressed as a percentage of volume gain over local wild seed at a certain age. Use of select seed can therefore have a significant positive influence on timber supply. No adjustments were applied however to account for the use of select seed in the base case forecast for the Prince George TSA.

Licensees indicated that 50 percent of spruce seedlings planted in the TSA are currently derived from select seed with an anticipated genetic gain of 18 percent. In response to the data package they also predicted that the use of select spruce seed will increase to 90 percent and select pine seed to 10 percent in the future. To account for these anticipated gains, licensees recommended that site indices be increased and modelled in the timber supply analysis.

Seed use records maintained by the BCFS indicate that currently 100 percent of spruce planted in the Prince George TSA is derived from select sources. Since the BCFS stores and prepares all tree seed used for reforestation, its seed use information is considered to be more accurate than that provided by the licensees. The average genetic gain of select spruce seed is 13 percent and it is expected to increase over time. The use and genetic gain of select lodgepole pine and Douglas-fir seed is also expected to increase in the near future as the orchards established for these species increase production. Since volume gains associated with genetics is more a function of the tree characteristics rather than site productivity, it is more appropriate to model timber supply impacts of using select seed by using TIPSY rather than by adjusting site indices.

Staff ran two sensitivity analyses to assess the impact of the current and projected use of select seed. The assessment of current select seed use and gain estimates indicates the short-term harvest could be 0.2 percent higher and the long-term harvest 3 percent higher than the base case. The assessment based on projected use and gains indicates a 4 percent increase in the short-term and 7 percent increase in the long-term. Realization of this projected volume increase is subject to the seed orchards meeting their expected production targets and the seed being used. It would therefore be premature for me to account for potential future volume increases at this time.

In consideration of the current use of select seed in the Prince George TSA and its impacts on timber supply, I directed staff to incorporate this information when revising the base case for the proposed MPB uplift. I am satisfied that this factor was appropriately accounted for in the subsequent projected timber supply forecasts and will therefore not discuss it any further.

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

Expected time for forest to be re-established following harvest

- regeneration delay

Regeneration delay is the period between a harvest start date and the time at which an area becomes occupied by a specified minimum number of acceptable well-spaced seedlings. In timber supply analysis, the end of the regeneration delay period is used as the starting point for projecting tree growth and stand volume over time.

In the analysis for the Prince George TSA, the majority of conifer-leading stands harvested were assumed to be planted within two to six years following harvest. Staff however indicated that the recent trend in reforestation practices is to plant immediately or one year after harvest. One public submission suggested that the regeneration delay period be lengthened to reflect the uncertainty of future climatic conditions and probable large-scale plantation failures. I do not have any specific data or information about what impacts possible future climate changes may have on regeneration delay and success, but I do anticipate that recent changes to reforestation practices will have an effect on timber supply.

In consideration of the recent trend to promptly reforest areas following harvest, I directed staff to include this new information in developing a revised timber supply forecast for the MPB uplift. The time between harvesting and planting for future managed stands was subsequently reduced from 3 years to 1 year in the revised base case analysis. I request that staff continue to monitor reforestation practices and make any necessary adjustments to the regeneration delay assumptions for the next timber supply review.

- impediments to prompt regeneration

Any significant impediments to prompt regeneration must be accounted for in the timber supply analysis. In the Prince George TSA, district staff indicate there are no impediments to prompt regeneration beyond those already accounted for under *regeneration delay* and *not-satisfactorily restocked and immature areas*. I have reviewed the assumptions concerning impediments to prompt regeneration and I am satisfied they are sufficient for the purposes of this determination.

In presenting this factor, staff also indicated there is a recent trend towards regenerating stands to achieve minimum rather than target stocking standards. Staff also indicated that a number of small patches harvested to control the MPB have or will be exempted from silviculture prescriptions and may not be reforested. Verification of these purported practices and their implications for timber supply should be assessed for the next determination.

- not-satisfactorily restocked and immature areas,

Not-satisfactory restocked (NSR) areas are those where timber has been removed by harvesting or natural causes and a stand of suitable forest species and stocking has yet to be established. Immature areas are those areas regenerated to managed stands and that are less than 20 years of age. NSR and immature areas contribute to the THLB variably based on assumptions concerning stand treatments and regeneration delay periods. I am satisfied the revised base case harvest forecast reasonably reflects these factors.

(iii) silviculture treatments to be applied to the area,

Silvicultural treatments to be applied

I have reviewed the information regarding silvicultural systems, incremental silviculture, and rehabilitation and I am satisfied the base case assumptions for these factors were appropriate. Though I recognize that these activities continue to evolve and change over time, and that such changes can be reflected in future analyses and determinations, I will not discuss my considerations for them further in this rationale.

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

Timber harvesting

Volume estimates used in the analysis for timber utilization and decay, waste and breakage reflect current practices and forest licence requirements. A licensee suggested that if utilization standards were more stringent the timber supply could be increased. If utilization standards change, I will give consideration to these changes in my next determination.

I have reviewed the information regarding the utilization standards and the decay, waste and breakage factors assumed in the analysis for the Prince George TSA, and I am satisfied that these factors reflect current practice and the best available information, and that they were appropriately modelled in the analysis.

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production,

Integrated resource management objectives

- cutblock adjacency/green-up

I have reviewed the information regarding the assumptions in the analysis for cutblock adjacency and green-up, and I am satisfied that current practices were appropriately reflected in the analysis. As a result, I will not discuss my considerations in detail in the rationale.

- visually sensitive areas

Careful management of scenic areas visible from communities, public use areas and travel corridors is an important forest management objective. The Forest Practices Code enables the management of visual resources by providing for scenic areas to be identified and made known, and by providing for the establishment of visual quality objectives (VQOs). A visual landscape inventory is undertaken to identify, classify and record visually sensitive areas. Based on this inventory, visual quality classes (VQCs) of preservation, retention, partial retention, modification, or maximum modification may be recommended to guide operational practices in an area. These recommended VQCs may become officially adopted and established by a district manager or through a higher level plan.

Since my last determination the completion of land and resource management plans (LRMPs) have helped identify visually sensitive areas and provide broad visual management objectives for the Prince George TSA. The timber supply analysis reflects known scenic areas, forest cover requirements for VQOs and VQCs, and current practices. BCFS staff, using the *Procedures for Factoring Visual Resources into Timber Supply Analyses, March 1998,* determined that the mid-range value for allowable alteration for each VQO zone was appropriate for the purposes of this assessment. In consideration of the Sustut Local Resource Use Plan, which recommends the preservation of the immediate zone along the Sustut River for visual, fish, recreation, and tourism reasons, 1296 hectares was removed from the THLB.

Licensees recommended that the maximum level of denudation allowed for each VQO be modelled in the timber supply analysis or in a sensitivity analysis, and that these maximum levels be increased by 2 percent for each VQO. They also suggested that slope calibrations be used to adjust the minimum visually effective green-up height of 5 metres.

I would support the use of maximum levels of denudation for this assessment if I were satisfied that this reflects current practice and that visual management objectives were being achieved. I also agree that adjusting green-up heights for slope could help refine the assessment of visually sensitive areas. I request that staff monitor visual design practices to assess the level of visual disturbance that is consistent with VQOs in the Prince George TSA, and incorporate this information in the next timber supply review. I also request that staff assess the use of slope classes to determine minimum effective green-up heights.

The timber supply analysis accounts for all areas known to licensees, and reflects the management constraints to which licensees are presently required to adhere. I therefore consider that for the purposes of this determination the constraints on timber supply from areas currently expected to be managed for visual quality have been modelled appropriately in the analysis.

- riparian

Riparian areas occur along streams, and around lakes and wetlands. The *Forest Practices Code Act of British Columbia - Operational Planning Regulation* requires the establishment of riparian reserve zones (RRZs), which exclude timber harvesting, and riparian management zones (RMZs), which restrict harvesting, to protect riparian and aquatic habitats.

In my last determination for the Prince George TSA I instructed staff to better quantify and account for RRZs and RMZs in the next timber supply analysis. Lake and wetland RRZs and RMZs were subsequently spatially located and, according to average management practices, portions removed from the THLB for this timber supply analysis. However, a comprehensive inventory of streams in the Prince George TSA, which represent the largest riparian impact on timber supply, was not available for this assessment. Stream RRZs and RMZs were subsequently estimated using sampling surveys and professional expertise. In total 236 182 hectares were deducted from the THLB in the original base case, and 233 898 hectares in the revised base case, for riparian protection and conservation purposes.

Licensees suggested that riparian reductions identified in the data package were overestimated due to the conservative application of stream classifications, the designations being made prior to the release of new stream classification guidelines, and that some riparian areas were also accounted for in other THLB reductions. Though I agree that the estimation of streamside riparian areas could be refined, I am not certain that a reassessment at this time would significantly change the estimates. It is also my observation that the estimated percentage reductions for riparian reserves in this TSA are comparable with those of other management units.

I therefore accept the assumptions used in this assessment. I encourage staff, subject to the availability of time and resources, to continue to improve the estimates for riparian areas for the next Prince George TSA timber supply analysis.

- identified wildlife species

Identified wildlife species refers to species at risk (red- and blue-listed) and to regionally significant species which are potentially affected by forest management activities. Identified wildlife species are not adequately accounted for within existing management strategies, such as those for biodiversity, riparian management, ungulate winter range or through the application of other forest cover constraints.

Species at risk, as defined under the Forest Practices Code, also include those species that are not considered at risk provincially but which have regional populations that may be threatened. The intent is that by addressing the habitat needs of these regionally important species early on, it may be possible to avoid them being listed as threatened or endangered at the provincial level at a later date.

Volume I of the Identified Wildlife Management Strategy (IWMS) was released in February 1999 and detailed several species which may occur in the TSA. Those species occurring in the Prince George TSA were identified in the analysis report. Identified wildlife species are intended to be managed through the establishment of wildlife habitat areas (WHAs) and implementation of general wildlife measures (GWMs). No WHAs have been established in the Prince George TSA to date so no area specific deductions for identified wildlife were made in the timber supply analysis.

However, based on data accumulated on the habitat requirements for the identified species, the estimated impact of the IWMS was projected at one percent of the short-term harvest level for the province. Government has also committed to limiting the impact of management for identified wildlife to this level in the short-term.

It is not possible in this determination to specify the exact location or precise amount of habitat area that will be required within the THLB to implement the IWMS. However, given the Province's commitment both to implement the IWMS, and to limit short-term timber supply impacts to one-percent province wide, as well as the expected occurrence of identified wildlife in this TSA, I requested that staff account for a one-percent reduction to the THLB, which amounted to 33 593 hectares, in developing the revised base case timber harvest forecast. I encourage appropriate staff to establish WHAs and implement GWMs prior to the next AAC determination for the Prince George TSA. The establishment of these areas is critical to protecting species at risk, and will assist with long-term planning and reduce operational conflicts between wildlife and harvesting.

- ungulate winter range

I have reviewed the assumptions used to account for ungulate winter range and I am satisfied that the analysis accurately represents the management of ungulate winter range in the Prince George TSA. Furthermore, I am confident that ungulate winter ranges were adequately accounted for through deductions made to the THLB in consideration of *environmentally sensitive areas*. As a result, I will not further discuss my considerations for this factor in this rationale.

- caribou

The Prince George TSA is home to both mountain (arboreal lichen feeding) and northern (terrestrial lichen feeding) caribou herds. These species are sensitive to disturbance, and the mountain caribou in the TSA have been designated a 'blue-listed' species.

Caribou habitat and populations are priorized into "High", "Medium", "Low", "Corridor" and "Unknown" management zones. Management strategies for the Prince George TSA caribou populations, based on these zonations, were endorsed in the Fort St. James, Prince George and Vanderhoof local resource management plans (LRMP). Those areas identified as 'Caribou High'—critical habitat required to support core populations—in the former two LRMPs were removed from the THLB (totalling 113 871 hectares in the original analysis and 108 214 hectares in the revised analysis) as specific management objectives were identified for these areas in the LRMPs. In associated 'Caribou Medium' areas—habitat required to support populations near the edge of their range—forest cover constraints were applied in the analysis.

Habitat for the northern caribou herd in the Fort St. James Forest District, identified in the Fort St. James LRMP and amounting to 60 593 hectares, was not deducted from the THLB as management objectives for this herd and area have not yet been defined. Similarly, no deductions were made to the THLB in consideration of the Vanderhoof LRMP as it did not specifically preclude harvesting activities in identified caribou habitat areas.

In October 2001 the BCFS, MWLAP and licensees in the Vanderhoof Forest District developed a habitat management strategy to maintain the quality of caribou habitat while providing opportunities for timber harvesting. This strategy, which restricts harvesting in some caribou habitat areas, was not considered in the analysis. Participants of the Vanderhoof Innovative Forest Practices Agreement (IFPA) suggest that this strategy could have a 0.9 percent downward impact in the mid- to long-term (121 to 170 years from now).

The future establishment of objectives for the northern caribou herd in the Fort St. James Forest District represents some uncertainty to the TSA's timber supply. Based on trends in other areas of the TSA and in consideration of the LRMP's caribou management strategy, I consider that future management objectives for this herd may to have up to a one percent downward pressure on the short-term timber supply.

The Vanderhoof Forest District caribou habitat management strategy also represents a risk that the original and revised THLB may be underestimated. I therefore accept the estimate made by the IFPA holders for this strategy's impact on the timber supply and will discuss this consideration further in my 'Reasons for Decision'.

- stand-level biodiversity

Biodiversity is defined as the full range of living organisms, in all their forms and levels of organization, and includes the diversity of genes, species, and ecosystems and the evolutionary and functional processes that link them. Under the Forest Practices Code, biodiversity in a given management unit is assessed and managed at both the stand and landscape levels.

Stand-level biodiversity management includes retaining wildlife trees and wildlife tree patches (WTPs), within or adjacent to cutblocks to provide structural diversity and wildlife habitat. Riparian reserves and other areas previously excluded from the THLB may also contribute to stand-level biodiversity retention.

For the analysis, forest district standards for WTP retention and samples of silviculture prescriptions from all districts within the Prince George TSA were reviewed to approximate the percentage of cutblock area retained in WTPs. The review accounted for areas that overlapped with riparian management areas and other areas outside the THLB. As a result, 131 877 hectares was deducted from the THLB in the original base case, and 137 518 hectares—approximately 4.1 percent of the THLB—in the revised base case to reflect the increase in WTP retention from 3.5 percent to 20 percent of the harvested area in the ICH.

Licensees suggested that WTPs be included in the THLB, doubled in area to 7 percent and assigned twice the average harvest rotation length. Since there are a number of uncertainties about the permanency of WTPs, I believe it would be premature to speculate that they will contribute to future timber supply. It is also doubtful that such an approach would alter long-term timber supply relative to the method used in the base case, and would reduce the short-term timber supply. For this determination, I am satisfied that the assumptions used in this assessment reasonably reflect current practice and provincial policy, and will make no further adjustments in this regard.

- landscape-level biodiversity

Achieving landscape-level biodiversity objectives involves maintaining forests with a variety of patch sizes, seral stages, and forest stand attributes and structures, across a variety of ecosystems and landscapes. Managing for biodiversity is based in part on the principle that these practices—together with other provisions in the Forest Practices Code, such as riparian management, maintenance of wildlife trees, and other forest cover objectives—will provide for the habitat needs of most forest and range organisms. A major consideration in managing for biodiversity at the landscape level is leaving sufficient and reasonably located patches of old-growth forests for species dependent on, or strongly associated with, old-growth forests.

The delineation and formal designation of 'landscape units' is a key component of a sub-regional biodiversity management strategy. Biodiversity management objectives for a landscape unit are established by assessing the unit's timber and non-timber values. The *Landscape Unit Planning Guide* outlines three biodiversity emphasis options (BEOs)—lower, intermediate and higher—which may be employed when establishing these objectives. The guide also recommends the seral stage distribution of forests within low, intermediate and high BEO landscape units by biogeoclimatic unit and natural disturbance type (NDT).

Interim landscape units and biodiversity management objectives for the Prince George TSA were identified in the *Regional Landscape Unit Planning Strategy*, released on October 31, 1997. Formal establishment of these landscape units and their BEOs is subject to future approvals.

The policy generally followed for timber supply analyses when landscape units and BEOs have not been formally established is to use the *Landscape Unit Planning Guide's* recommended weighted average of 45 percent for low BEOs, 45 percent for intermediate BEOs, and 10 percent for high BEOs. The Prince George TSA base case therefore incorporated these weighted averages as applied to the THLB.

Since there is uncertainty about how the *Landscape Unit Planning Guide* will be applied if and when the proposed landscape units and BEOs are approved, sensitivity analyses were performed to evaluate the impact on timber supply for several landscape-level biodiversity management strategies.

Several public comments concerning landscape-level biodiversity were received. These submissions generally questioned whether biodiversity could be adequately sustained through current forest management policies and practices. While I acknowledge these concerns, the *Landscape Unit Planning Guide* and LRMPs serve as the best available guidance concerning biodiversity conservation within the broad context of forest management in BC at this time. I trust that completion and establishment of landscape unit biodiversity objectives, within the context of the regional strategy and the biodiversity management principles and practices contained in the *Landscape Unit Planning Guide* will provide for adequate protection of biodiversity.

I have reviewed the assumptions made to account for landscape-level biodiversity in the Prince George TSA, and in general I am satisfied the assumptions appropriately reflect the provincial policy direction for achieving landscape-level biodiversity requirements provided in the *Landscape Unit Planning Guide*, as well as provide results that are consistent with the TSA's LRMPs.

My consideration of the assumptions for which I believe some adjustment or further discussion or explanation is required is detailed below.

1) seral stage requirements

Current government policy requires that old seral stage targets be met immediately in intermediate and high BEO areas. If it is not immediately possible to achieve targets in these areas, then Old-Growth Management Areas (OGMAs) are to be designated in mature forested areas to recruit old seral stage forests. Old forest requirements in areas with a low BEO may be met within three rotations.

A sensitivity analysis was conducted to assess the effect on harvest forecasts of immediately applying old seral stage requirements across the landscape units and by applying the proposed BEOs targets being considered by the district managers. This assessment, described in the analysis report, indicated that the base case harvest forecast could consequently drop in 30 years to a long-term level slightly below that described in the original base case. The relatively balanced age class distribution of both the timber and non-timber harvesting land bases also suggests that the non-timber values of mature forests can be maintained over time.

However, since there is uncertainty about the final application of BEOs in the Prince George TSA, I am satisfied that the assumptions used in the base case are suitable for use in this determination. I will revisit this assessment in the next timber supply review subsequent to the approval of landscape units and their biodiversity objectives, and establishment of OGMAs.

2) future ages of non-contributing forests

In the timber supply analysis for the Prince George TSA, forests outside the THLB were assumed to continue to age over time such that eventually all non-contributing forests were over 250 years of age. The implication of these assumptions is that no allowances are made for the possible influences that natural stand disturbances, such as fire, insects and disease, may have through time. In terms of modelling landscape-level biodiversity, a larger proportion of the old seral requirements are assumed to be met over time by non-contributing forests than would actually be achieved.

In the Prince George TSA, natural disturbances such as large wildfires and epidemic insect outbreaks affect the age class structure of the forests on the non-contributing land base.

District and Timber Supply Branch staff therefore agree that the continued and indefinite ageing of the non-contributing forest is unlikely. Public input also expressed concerns about the validity of these assumptions. Sensitivity analysis, in which the stands on the non-contributing land base were assumed to be disturbed after they reached 300 years of age, rather than assumed to continuously age, showed a negative effect to timber supply after 11 decades.

I have reviewed the information regarding the analysis assumptions about the ageing of the forests on the non-contributing land base. Although I believe it is unrealistic to assume continuous ageing of the non-contributing forests and that accounting for it would create a downward pressure on timber supply in the long-term, I am satisfied that there are no implications to timber supply in the short-term for the purposes of this determination. None-the-less, I requested that staff consider the ageing of the non-THLB in developing the revised base case for the proposed MPB uplift.

- environmental assessment

As part of my review of the original Prince George TSA base case, MWLAP staff presented an overview of an environmental assessment being conducted within the TSA. This assessment is aimed at qualifying the risks to ecosystem biodiversity associated with harvesting and forest management by comparing and contrasting the effects of these activities with those of natural disturbance patterns. In this assessment old-growth forests are used as indicators of ecological integrity as they are structurally different from second-growth forests and because they contain species dependent on the habitat they provide and which are sensitive to disturbance.

The environmental assessment involves predicting the amount of old forest area that would be present over time in consideration of natural stand replacement intervals and anticipated harvest levels. Preliminary estimates were identified for both operable and inoperable forest land by biogeoclimatic variant. Qualitative risks were assigned to the amount of old forest remaining over time. The assumption used for this assessment was that the closer a landscape resembles natural patterns and processes, the lower the risk to ecological values. Conversely, the further the age structure of the forest moves beyond the historic range of variation, the greater the risk to biodiversity.

I have reviewed and support BCFS and MWLAP staff's ongoing efforts to develop an assessment to help define conservation implications of harvest levels. I have discussed the approach with a number of experts and am advised of its strengths and weaknesses, both of which will be addressed through further review and development of the analysis techniques and assumptions. Conducting additional peer reviewed research will also allow better understanding and comparison of the assessment's quantitative analysis and qualitative conclusions.

In the meantime, having reviewed this assessment I remain mindful that the findings and methodology are still under development, and therefore cannot conclude that the original and revised base case harvest level poses an unacceptable risk to the maintenance of biodiversity. However, I am aware the analysis suggests that the trends in age classes and biogeoclimatic units will move beyond BCFS and MWLAP staff's best understanding of historical natural ranges. The timber supply analyses represented management practices that reflect current provincial policies and guidelines for biodiversity management. While there may be disagreement about the appropriate balance of risks to different environmental, social and cultural values, I believe that current policy provides the best indication to me of that balance at this time. If environmental assessments lead to revisions in provincial policy or highlight obvious extreme risks, I will consider that information in future determinations.

I look forward to the continued development and refinement of this assessment for future use and application in informing AAC decisions about specific conservation concerns. I also observe that the development of this tool will likely have more of an immediate application to forest management policies and land allocation than AAC determinations.

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

Land and resource management plans

Portions of plans arising from strategic land-use planning processes such as regional or subregional planning (e.g., land and resource management plans (LRMPs)) may be declared as higher level plans under the Forest Practices Code. A higher level plan defined under the Forest Practices Code establishes government's social, economic and environmental objectives, thereby setting the resource management context for developing subsequent operational plans.

Three LRMPs covering the Prince George TSA, as described earlier, were completed and approved by government since my last determination. Protected areas identified in the LRMPs were excluded in the derivation of the THLB in the analysis. My consideration of LRMP recommendations that guide current practices for Crown land plans, caribou habitat, and visual sensitive areas are discussed separately under each respective factor.

I believe that through the ongoing implementation of these approved LRMPs, that increasingly greater clarity around the management of specific resource values will be attained. If during the period of this determination management considerations for specific values change relative to those currently arising from the LRMPs, I will take these considerations into account in my next determination.

Innovative Forest Practices agreement

Under Section 59.1 of the *Forest Act*, the Minister of Forests may enter into an Innovative Forestry Practices Agreement (IFPA) with the intent of improving the productivity of the forest resource. The Vanderhoof IFPA group, comprised of five major licensees and the ministry's Small Business Forest Enterprise Program (SBFEP) operating in the Vanderhoof Forest District, was awarded the Vanderhoof IFPA in June 2001. A forestry plan has been submitted and is currently under review by the regional manager.

The projects under the IFPA are a collaborative effort between licensee and ministry staff to improve information through research, and data collection and analysis. This information will be used to support a request to the regional manager to provide the IFPA participants an AAC increase. Pending approval of the forestry plan, the regional manager will evaluate the AAC uplift request.

I have reviewed the information regarding the IFPA and congratulate those involved for their efforts under this agreement. I am satisfied that there are no implications for this determination. I look forward to any improvements in information which may result from the projects, and which may be relevant for a future timber supply review.

First Nations considerations

Nine First Nations bands have communities within the TSA, including Nak'azdli, Takla Lake, Tl'azt'en, Nadleh Whut'en, Stellat'en, Saik'uz, Lheidli T'enneh, McLeod Lake, and Yekooche First Nations. The Cheslatta, Lhoosk'uz Dene, Ulkatcho, Gitxsan, Natoot'en, Kaska Dena, Tsay Keh Dene, Red Bluff, Lake Babine, Nazko, and Tahltan First Nations, in addition, to the nine First Nations with communities, have asserted traditional territories within the TSA. A number of these First Nations are participating in the British Columbia Treaty Process and are at either Stage 2 (Cheslatta) or Stage 4 (Carrier Sekani Tribal Council, Nazko, Gitxsan, Kaska Dena, Lheidli T'enneh, Tsay Keh Dene and Yekooche) of the land claim process.

All of the mentioned First Nations were provided with copies of the analysis report and the public discussion papers, and were invited to provide their comments. While two First Nations provided comments on the October 2001 analysis report and public discussion paper, no comments from First Nations groups were received on the March 2002 public discussion paper.

In response to the analysis report, the Carrier Sekani Tribal Council (CSTC) expressed concern that timber harvesting continues in their asserted territory while negotiations are taking place, and opposed harvesting when environmental and social impacts are not considered. The CSTC also indicated that it could not support the analysis report as it did not reflect volume confirmed to them for a Community Forest Pilot Agreement, under a Forestry Bridging Agreement. I note that environmental considerations were made in defining the area suitable for timber harvesting, and in developing and applying forest cover requirements in the timber supply analysis. Both of these factors are important determinants of timber supply. Social impacts are also important considerations, when they are related to timber harvesting. Localized social and cultural concerns are frequently addressed during operational planning. Some culturally-related land base deductions made for the timber supply analysis are discussed under cultural heritage resources. At this time I am unaware of additional First Nation-related social or cultural issues that affect timber supply. With respect to CSTC opposition to ongoing timber harvesting during treaty negotiations, I am unaware of information that clearly demonstrates infringement of rights and title in the TSA. While this expression of interest introduces uncertainty to my determination, I am uncertain about the nature of potential aboriginal rights and title held by the CSTC, and of their potential timber supply implications, if any. With respect to the volume the CSTC assert has been confirmed to them, as I state in my 'Guiding Principles' my AAC determination is separate from allocation decisions made and timber harvesting rights provided by the Minister. Finally, I am aware that the CSTC has taken a human rights complaint to the Organization of American States (OAS) claiming that harvesting contradicts their traditional rights. I have been made aware that this complaint has been stayed by the CSTC. Given the status of this complaint, I cannot speculate on the potential implications for forestry in the Prince George TSA.

The Tl'azt'en Nation indicated that the timber supply review did not account for its recently completed traditional use study (TUS). TUS results are considered during landscape- and stand-level planning where potential effects on aboriginal rights can most effectively be analysed and accommodated. I am uncertain at this time of whether any future accommodations made respecting the TUSs will affect timber supply. If more information becomes available, I will consider it in future AAC determinations.

I am aware that all First Nations mentioned in the first paragraph of this section have asserted title to areas within the Prince George TSA. For those groups involved in the treaty process, these claims are summarized in the treaty process Statements of Intent. Other groups have asserted title as part of discussions and consultations respecting operational plans. Many of the claims overlap geographically. Having reviewed these assertions, as well as the information provided by First Nations through the timber supply review, I observe that the nature and scope of the claims remain inconclusive, and as such I am not convinced at this time that they would logically extend to an impact on the AAC. I am aware that the Saik'uz First Nation initiated litigation related to consultation in respect of an advertisement for license applications for areas that overlap with their asserted traditional territory. In this litigation the Saik'uz assert aboriginal rights and title to areas west of Prince George; however, this litigation is currently in abeyance. While all of these title claims introduce uncertainty to my determination, given information available to me, I am uncertain as to the existence, geographical extent, location and nature of potential aboriginal rights and title, and consequently the extent of timber supply implications, if any, for the TSA. Based on my knowledge of and familiarity with the technical details of timber supply forecasts, I assert that changes in timber supply do not always translate into AAC impacts in the short term. As such, I am confident that, based on the nature of the original and revised base cases, the Prince George TSA timber supply is sufficiently robust to absorb the uncertainty respecting aboriginal title until such time as further clarity is gained.

I have considered the recently signed McLeod Lake Indian Band Treaty No. 8 Adhesions and Settlement Agreement in this timber supply review. This agreement was reached between the McLeod Lake Indian Band and the federal and provincial governments. As result, 20 601 hectares of Crown forest, of which 16 601 hectares was identified as part of the potential THLB in the original base case and 16 583 hectares in the revised base case, was deducted in the analyses. When final adjustments for adhesions or severalty lands are made over the next 15 years time, the location and amount of the THLB deductions may change but there will not likely be an increase to the total area of Crown land deducted.

Based on my considerations documented above, I will make no adjustments to the timber supply with respect to First Nations issues at this time.

Any decisions on treaty negotiations with the First Nations that are undertaken by government will be reflected in future AAC determinations for the TSA. The AAC that I determine should not in any way be construed as limiting the Crown's legal obligations resulting from recent court decisions, including those in the Supreme Court of Canada, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within the Prince George TSA.

Splitting the TSA

The Prince George TSA is one of the largest TSAs in the province. Its size has been a concern for many interest groups since it was established in the late 1970s. Most of these concerns are related to the location of harvesting, flow of logs, location of timber processing facilities, employment opportunities and community stability. Since salvage operations were undertaken in the Bowron Valley in the Prince George Forest District in the 1980s, harvesting operations have been disproportionately concentrated in the Prince George Forest District. Furthermore, much of the volume harvested in the Fort St. James and Vanderhoof Forest Districts is transported to Prince George for processing. These issues and concerns were identified and discussed during negotiations for the LRMPs covering the TSA's three districts.

At the request of several local communities, the BCFS recently assessed the timber supply implications of treating each district within the Prince George TSA as a separate TSA. This assessment, repeated again for the timber supply analysis, indicated that a steady state harvest flow from each of the three districts was achievable, but would result in a net shortfall of 200 000 cubic metres per year in the mid- to long-term.

I have reviewed the assessment and public comments associated with splitting the TSA and agree there are a number of community, forest management and timber supply implications associated with maintaining a TSA as large as the Prince George TSA. However, only the minister has the authority under Section 7 of the *Forest Act* to consolidate, divide, or abolish TSAs or order their boundaries to be changed. Consequently, for the purposes of this determination I will assume that the Prince George TSA will remain as is for the effective period of this determination and will not make any associated adjustments to the TSA's timber supply.

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,

Alternative rates of harvest

The nature of the transition from harvesting old growth to harvesting second growth is a major consideration in determining AACs in many parts of the province. In the short-term, the presence of large volumes of older forests often permits harvesting above long-term levels without jeopardizing future timber supply. In keeping with the objectives of good forest stewardship, AACs in British Columbia have been and continue to be determined to ensure that current and medium-term harvest levels will be compatible with a smooth transition toward the usually (but not always) lower long-term harvest level. Thus, timber supply should remain sufficiently stable so that there will be no inordinately adverse impacts on current or future generations. To achieve this, the AAC determined must not be so high as to cause later disruptive shortfalls in supply nor so low as to cause immediate social and economic impacts that are not required to maintain forest productivity and future harvest stability.

Though the timber supply of the Prince George TSA is relatively robust as compared with other management units in the province, increasing the short-term harvest level could have implications for the mid- and long-term harvest levels. Two alternative harvest flows were presented in the *Prince George Timber Supply Area Analysis Report October 2001.* The first one indicated that if the initial harvest level was increased by 37 percent for one decade, the harvest level would subsequently decline to the long-term harvest level in only 40 years. The second harvest flow scenario suggested that if the short-term harvest level was increased by 37 percent for 40 years, the mid-term harvest levels would be significantly reduced.

Alternative harvest flows were also presented in the public discussion paper on the proposed temporary uplift for the MPB. In consideration of new information and assumptions used to develop a revised base cast forecast and project the impact of the MPB, it was found that a temporary AAC increase of 1 to 3 million cubic metres could actually increase the mid- to long-term timber supply of the Prince George TSA. This increase is attributed to reducing further MPB losses and reforesting harvested MPB stands. My considerations of the implications for these alternative harvest flows are discussed further under Epidemic mountain pine beetle infestation and 'Reasons for Decision'.

Community implications

I have reviewed the information presented about the implications to communities of fluctuations in the harvest level in the Prince George TSA, including the information in the socio-economic analysis completed as part of the timber supply review for the TSA, including the proposed uplift for the MPB. I am aware of the potential implications to communities of changes in the harvest levels for the TSA and will address this further under Epidemic mountain pine beetle infestation and 'Reasons for Decision'.

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

Existing mills and their requirements

In 2000 there were 27 mills operating in the Prince George TSA, including 19 lumber mills, three pulp mills, one paper mill, two chip mills, one pole producer and one veneer plywood mill. Forest Service staff indicate that the solid wood mills processed about 10.1 million cubic metres of timber annually between 1998 and 2000. I note that this mill capacity is approximately one million cubic metres greater than the current AAC, and that the additional supply is likely obtained from nearby private lands, woodlots, and adjacent TSA and TFLs. This suggests the TSA's current harvest is fully utilized by mills in the TSA.

If the local mills were to operate at a full 2-shift operating capacity, it is projected they could process an additional 2.6 million cubic metres of timber. It is also possible that existing mills could process more volume by operating more shifts. Increasing the timber supply by 1 to 3 million cubic metres per year to control the MPB would increase the annual sawlog supply by 0.8 to 2.4 million cubic metres. However, given the existing log size requirements of some mills, not all existing mills in the TSA will be able to process the additional lodgepole pine timber.

I have considered this information and the associated public comments received on both the original timber supply analysis and the proposed AAC uplift for the MPB in making this AAC determination. I will discuss milling requirements further under Epidemic mountain pine beetle infestation and 'Reasons for Decision'.

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia,

Minister's letter and memorandum

The Minister has expressed the economic and social objectives of the Crown for the province in two documents to the chief forester—a letter dated July 28, 1994, (attached as Appendix 4) and a memorandum dated February 26, 1996, (attached as Appendix 5). The letter and memorandum include objectives for forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest-level changes in a managed transition from old-growth to second-growth forests, so as to provide for community stability.

The Minister stated in his letter of July 28, 1994, that "any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability." He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end he asked that the chief forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. To encourage this the Minister suggested consideration of partitioned AACs.

I have considered the contents of the letter and memorandum in my determination of an AAC for the Prince George TSA. As discussed earlier under *deciduous stands*, I will set a partition for deciduous-leading stands in this determination. I am satisfied that this determination is consistent with the economical and social objectives as expressed by the minister.

Local objectives

The Minister's letter of July 28, 1994, suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives. Many public responses to the information report and data package, timber supply and socio-economic analyses, and public discussion papers were received. The summary of public input is reproduced in full as Appendix 6.

LRMPs have been approved for each district in the Prince George TSA after years of public dialogue and negotiation. These plans serve as important statements of local objectives and form current practice in the Prince George TSA. I have therefore accounted for those elements of these plans that could effect timber supply this determination.

I am mindful of the public input received and where possible I have attempted to respond briefly to specific concerns in this rationale. I note that some of the public input relates to items beyond my mandate for consideration under the *Forest Act*, which relates specifically to the determination of AACs for TSAs and TFLs. Local objectives have been an important consideration in my determination of an AAC for the Prince George TSA.

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

Unsalvaged losses

Unsalvaged losses are timber volumes destroyed or damaged by agents such as fire, wind, insects and disease that are not recovered through salvage operations. Timber volume losses due to insects and diseases that normally affect existing stands (endemic losses) are generally accounted for in inventory sampling for existing timber yield estimation or through other methods. Losses due to epidemic (abnormal) infestations on the THLB were treated separately in this analysis.

In my last determination I encouraged staff to conduct a more rigorous evaluation of non-recoverable losses due to epidemic losses for the next timber supply review. Using new provincial standards, district staff subsequently reviewed existing data on epidemic losses for use in this determination. Specific insects examined in this analysis included the spruce beetle, Douglas-fir beetle, and the hemlock looper. Epidemic losses due to the mountain pine beetle (MPB) prior to 1998 were also accounted for in this assessment. Epidemic losses attributed to the MPB since 1998 are discussed separately under Epidemic mountain pine beetle infestation below.

The analysis estimated that annual unsalvaged epidemic losses on the Prince George TSA THLB amounts to 353 800 cubic metres. This volume was excluded from the base case harvest levels for the entire timber supply forecast. Deductions made for spruce beetle were considered to be reasonable even though this insect's population is increasing. Losses attributed to the Douglas-fir beetle are also considered to be reasonable as the majority of damaged Douglas-fir stands are sanitation harvested. No deductions were made for hemlock looper in the analysis as the current infestation appears to be receding and has not affected salvageable timber volume. Harvest occurring in the cedar-hemlock stands under non-replaceable forest licences also captures significant volumes of looper damaged timber.

Some public input suggests the recent hemlock looper outbreak is the only outbreak ever recorded, and that it is erroneous to account for it as an annual event unless the volume is averaged over at least 100 years. Surveys conducted by the Canadian Forest Service however indicate that this is the second such outbreak in the past 50 years. None-the-less, looper damage to timber and recovery of part of that volume were projected to occur on annual basis in the analysis. I have consider this and other public comments received on the harvest of these stands and the control of the hemlock looper, and have discussed them further under *cedar-hemlock stands*.

An aerial survey performed by the BCFS in August 2001 revealed an outbreak of two-year budworm (*Choristoneura biennis* Freeman) in spruce- and balsam-leading stands in the Fort St. James District. The gross losses from this infestation are estimated to be 164 000 cubic metres per year. The SBFEP is able to salvage 24 000 cubic metres per year leaving an estimated 140 000 cubic metres per year of unsalvaged losses. This recent information was not considered in the original analysis. I therefore directed staff to account for these losses in the revised base case timber harvest forecast for the proposed AAC uplift for the MPB. I am satisfied that the revised base case adequately reflects unsalvaged epidemic losses, other those attributed to the recent mountain pine beetle infestation, anticipated to occur in the Prince George TSA.

Epidemic mountain pine beetle infestation

- background

The central interior of British Columbia is experiencing one of the worst MPB outbreaks in recent history. MPB infestations are natural events, however since 1995 the MPB population has grown to epidemic levels. Most of the mature (over 80 years) lodgepole pine stands in the TSA are threatened. Based on the location and extent of this outbreak, BCFS staff estimate over 350 million cubic metres of timber in lodgepole pine stands are at risk. The BCFS and licensees have embarked upon an aggressive management strategy in an effort to control the spread of the MPB. Despite these efforts, the current epidemic will likely continue to spread unless there is a severe winter, with temperatures colder than -40 degrees centigrade for several days, which can significantly reduce its population.

The MPB, *Dendroctonus ponderosae* Hopkins (Coleoptera: Scolytidae), is widely considered to be the most damaging of all the insects that attack lodgepole pine in western Canada. The insect is a small, cylindrical — shaped bark beetle that kills mature trees by boring through the bark, mining the phloem — the layer between the bark and the cambium or inner wood of a tree — and interrupting the flow of nutrients up the tree stem. Details of its life cycle and its devastating power in destroying forests are presented in Appendix 3 to this document, *Forest Insect and Disease Survey, Forest Pest Leaflet No. 76*, a Forestry Canada publication.

Trees attacked by the MPB are classified under one the following three stages. These stages correspond with the life cycle of the MPB, as described in the above publication, and the corresponding change of colour that occurs in attacked trees.

- ***'green-attack'*** in the first year, during which the insect migrates to and establishes 'brood trees' (where larvae will later mature into adults and eventually spread again to surrounding trees)—this stage is less readily identifiable visually from a distance than are the later stages;
- ***'red-attack'*** in the next year, beginning in spring, when the foliage of the already-attacked and dying trees is red in colour and clearly identifiable visually from a distance and from the air;
- ***'grey-attack'*** in subsequent years when the trees are dead and standing without needles. BCFS staff predict that standing grey-attack trees in the Prince George TSA will only remain merchantable for up to 5 years.

An aerial survey conducted in 2001 indicated the MPB is expanding even more rapidly than previously estimated. The results of this survey were not known when the *Prince George TSA Timber Supply Analysis Report* and *Public Discussion Paper* were compiled and subsequently released in October 2001. This analysis report and discussion paper suggested that the current epidemic could be managed within the current harvest levels. In consideration of the recent survey information I requested that staff conduct further analysis of the epidemic, including associated social, economic, and environmental considerations, prior to determining the AAC. I also directed staff to incorporate recent information regarding other factors, as discussed previously in this document, in developing a revised base case timber harvest forecast. This information was provided to the public in the form of a second discussion paper released in March 2002.

- survey methodology and results

An aerial survey of the Prince George TSA was conducted in 2001 to assess the current infestation and spread of the MPB. This survey was conducted in accordance with the *Forest Health Aerial Overview Survey Standards for British Columbia,* June 2000. Red-attack trees, trees attacked in 2000, were identified from the air and mapped accordingly using a geographic information system (GIS). The total area infested and the severity of the infestation were estimated using this survey information. To derive an estimate of the total area affected, the following procedures were used. Small areas containing 2 to 30 red-attack trees were prescribed an area of 0.25 hectares. Small areas containing 31 to 50 red-attack trees were prescribed an area of 0.5 hectares. For areas containing more than 50 red-attack trees, a polygon was drawn around the area containing the attacked trees and the size of the polygon was estimated. The total area infested was the sum total of the areas estimated according the three procedures described above. The severity of infestation in the larger areas was classified based on the percentage of recently killed trees as follows: *light* (1 to 10 percent), *moderate* (11 to 29 percent), and *severe* (greater than 30 percent). Infestations in the smaller areas were considered *severe*.

The methodology used in the 2001 survey is compatible with that used in surveys conducted in previous years. Thus together the survey results can be used to monitor and project the rate of spread of the MPB. The following table summarizes the results of the MPB surveys conducted between 1998 and 2001 by district.

Table 2. 1998-2001 MPB Survey Results — Total Red-Attack Area by District (number of hectares)

District	1998	1999	2000	2001
Prince George	—	5 409	7 419	29 614
Vanderhoof	116	12 509	34 982	77 944
Ft. St. James	—	9 233	27 306	86 911
Total	**116**	**29 150**	**71 707**	**194 469**

The 2001 survey results indicate that MPB infested 194 469 hectares of forest in the TSA the previous year. This represents a 280 percent increase since 2000. Of the total red-attack area identified in 2001, 136 710 hectares was considered light, 47 970 hectares moderate, and 9790 hectares servere. The MPB attack is most extensive in the Vanderhoof and Fort St. James Forest Districts. The Prince George Forest District experiened a four-fold increase in the area attacked, though the areas attacked were scattered and on a smaller scale as compared with that in the other two districts. As a result of these dispersed attacks, the total area attacked in the Prince George Forest District could be overestimated by using the procedures described above.

Staff however also indicated that the overall results of the 2001 aerial survey underestimate the actual amount and serverity of the MPB attack. This conclusion was based on a comparision of the aerial survey results with ground surveys, which provide a more accurate count of red-attack trees in an area. Ground surveys tend to reveal a greater number of red-attack trees than aerial surveys during epidemic conditions.

Staff estimate the area attacked in 2001, which will become evident this spring as the attacked trees turn red, to be at least 428 000 hectares. This conservative estimate is based on the observed rate of expansion in the Vanderhoof Forest District, which is estimated to be 2.2 times per year. Based on rates of expansion I have observed in adjacent TSAs, the actual area of attack in the Prince George TSA could be even higher.

Based on my review of the information presented to me and trends in other areas, I believe that a projected expansion rate of 2.2 times per year is realistic and suitable for the purposes of this determination.

- management strategies

Last year in response to the growing MPB epidemic the province developed a bark beetle strategy. This strategic plan consisted of the appointment of a beetle management coordinator; introduction of a bark beetle regulation; amendments to the stumpage system; provision for transferring cutting rights across TSA boundaries; administrative efficiencies; increased cut control flexibility; coordination of fire protection; improved transportation infrastructure; and pursuit of federal emergency funding.

All of the Vanderhoof Forest District, the southern portion of the Fort. St. James Forest District and the southwestern portion of the Prince George Forest District have been designated an 'emergency bark beetle management unit' under the *Bark Beetle Regulation.*

Accordingly, both aggressive and sanitation measures, including harvesting, must be undertaken in this unit to control the MPB infestation. District managers have subsequently directed the majority of the ministry's SBFEP harvest to those areas infected with MPB, and, in the case of the Fort St. James District, also the spruce bark beetle. Licensees, for the most part, have also accepted this challenge and redirected their harvesting activities towards the control of bark beetles.

The growing epidemic will require additional effort and resources if any impact is to be made on controlling the MPB population. The SBFEP is already fully committed to the MPB strategy. Licensees' ability to extend their efforts are constrained by lumber markets and prices, and existing mill requirements and capacity. Combined, the former two factors have resulted in an estimated 1.5 to 2 million cubic undercut of the existing AAC in the past year. The ability for the regional manager to redirect more of the licensees' harvest towards MPB infected stands under the authority provided under Part 6 of the forest licences, is also constrained by these limiting economic factors.

BCFS staff indicated that if the AAC were temporarily increased and new licences were issued for this volume, the rate of spread of the MPB might be controlled. Staff indicated that priority would be placed on harvesting green-attack trees in the emergency bark beetle management unit. According to research conducted by the Canadian Forest Service (CFS), at least 80 percent of the beetle brood must be eliminated in order to suppress the MPB population during epidemic conditions. The provincial bark beetle strategy has therefore adopted a goal of eliminating 80 to 100 percent of the beetle brood in the aggressive management zones.

Harvesting MPB infested areas would help halt the spread of the MPB and allow for the planting and management of stands to improve future productivity. Licensees in the Prince George TSA have indicated their general support of this proposal and several also indicated their willingness to increase the number of shifts in their mills to facilitate processing of additional MPB-attacked timber. Staff have estimated that mills in the central region could process an additional 2.6 million cubic metres of solid wood per year based on a 2-shift capacity. By adding a third shift it is possible to process more volume.

In consideration of the above matters I believe it is appropriate to consider a temporary AAC uplift as part of the management strategy to control the MPB. The issues and need for such an AAC uplift are very similar to that of the Quesnel and Lake TSAs, where I increased the level of harvest temporarily by 1.0 million cubic metres and 1.5 million cubic metres respectively, last year.

- timber supply forecasts

As mentioned several times earlier in this document, a revised base case was used to examine the impact of the MPB infestation on the Prince George TSA timber supply. Staff revised the original base case harvest forecast to reflect more recent information on current forest management practices, the land available for timber harvesting, and timber yields. Specifically, the new information used to revise the base case included: increasing the deductions made for wildlife tree patches in the interior cedar-hemlock forests from

3.5 percent to 20 percent of the harvested area; incorporating the results of the vegetation resources inventory sampling; accounting for a 1 percent reduction of the THLB for identified wildlife species; reducing the regeneration delay period for managed stands from 3 years to 1 year; reflecting the current use of select seed; accounting for unsalvaged losses due to the two-year budworm; and accounting for the ageing and disturbance of the non-THLB.

The revised base case indicated that a harvest level of 9 083 661 cubic metres per year could be maintained for 35 years before decreasing to a steady long-term harvest level of 8 684 000 cubic metres after 65 years. Upon review of the information presented to me I am satisfied that the revised base case is suitable for the purposes of this determination.

Staff conducted a number of sensitivity analyses using this revised base case to predict to outcomes of several MPB management scenarios. These scenarios included no increase to the revised base case harvest forecast and several incremental temporary increases to the AAC. In these scenarios the potential volume and area impacted by the MPB now and over the next five years was based on a conservative rate of spread of 2.2 times per year, the currently observed rate of spread in the Vanderhoof Forest District.

If the current MPB epidemic were left unchecked and attacked stands regenerated to an unmanaged state, the harvest level is forecast to decline by 200 000 cubic metres per year beginning in 35 years relative to the revised base case. Since a significant portion of the Vanderhoof Forest District, the southern portion of the Fort St. James Forest District and the southwestern portion of the Prince George Forest Districts are covered by mature pine stands, the effects of this reduction would be more immediate and consequential in this area. This in turn could have some significant short-term socio-economic implications for communities in the TSA.

A number of analyses assessed the timber supply implications for attempting to control the MPB through the temporary harvest of an additional 1, 2 and 3 million cubic metres, respectively. These forecasts assumed most of the harvest would be directed to green-attack trees over the first five-year period. Furthermore, all the same forest cover constraints (e.g., landscape-level biodiversity, wildlife habitat, visual quality and adjacency requirements) applied as they did in the revised base case. Sensitivity analyses of these forecasts were also conducted to assess the implications of applying site index adjustments based on the old-growth site index (OGSI) research to reflect increased productivity of future managed forests (as discussed earlier in '*site productivity estimates*'), reducing the minimum harvest ages, and directing the additional harvest specifically to the Vanderhoof Forest District during the first five years.

The analysis indicated a short-term AAC increase of 1 to 2 million cubic metres for five years would not significantly slow the epidemic, though the long-term harvest levels would be better than the 'no increase' option due to the reforestation and stand management activities that would occur on harvested areas. A temporary 3 million cubic metres per year uplift could however reduce the impact of the MPB and bring it within manageable levels if this harvest were sustained for five years. Furthermore, regeneration on these harvested areas would return the harvest level projection to levels indicated in the revised base case in 80 years, which is also 200 000 cubic metres higher than the 'no increase' option.

When OGSI adjustments were factored into the sensitivity analysis for the 3 million cubic metres temporary uplift, the harvest level was projected to drop to 9 083 661 cubic metres after 5 years and be maintained at that level for 80 years and then increase to a long-term level of 9 684 000 cubic metres. This projected long-term harvest level is 1 million cubic metres greater than that projected in the revised base case.

The analysis however also indicated that a significant timber supply shortfall will occur in the Vanderhoof Forest District regardless of which MPB management strategy is undertaken. However, this shortfall could be diminished by continuing to direct all of the 2 million cubic metres per year currently allocated to the district to MPB-attacked stands, directing the majority of a temporary 3 million cubic metres per year uplift to that district, and reducing minimum harvest ages of pine in that district from 80 to 60 years. Reducing minimum harvest ages is considered appropriate as the MPB attacks younger pine stands as well as mature stands during epidemic conditions. Although this strategy does not completely alleviate the harvest shortfall anticipated to occur in 5 to 10 years from now, its does provide for a return to a steady harvest flow of 2 million cubic metres per year thereafter.

I am satisfied that assumptions used to project the timber supply forecasts were appropriate and reasonable for the purposes of this determination. I will discuss my considerations of this analysis further under 'Reasons for Decision'.

- environmental concerns

The large-scale salvage of insect damaged timber has a number of implications for environmental concerns and values. These include the potential for: reduced coarse woody debris, affecting species that depend on it and predators that rely on them; loss of habitat for woodpeckers and other cavity nesting birds; loss of mature forest habitat, which favours some species but is detrimental to others; increased peak stream flow and storm flow volumes in streams and rivers; and increased road development, which may lead to erosion, habitat fragmentation, altered predator-prey behaviour, and improved access to hunters and poachers.

In response to the public discussion paper on the proposed AAC uplift for the MPB, the Department of Fisheries and Oceans expressed concerns regarding the protection of fish and fish habitat and made some specific recommendations to assess and mitigate some of these concerns. Another individual also indicated an increase in roads would have a negative effect on deer and moose populations.

MWLAP staff made several recommendations to limit the negative impacts of extensive logging on wildlife resources. These include: assigning a harvest priority to active infestations where containment may be effective; leaving non-susceptible and unattacked trees at the both the landscape and stand level; retain structural elements (e.g., wildlife tree patches) within stands wherever possible; aggressive deactivation of new access to previously unroaded areas; and development of a carefully planned program of harvesting that considered impacts to landscape and stand level environmental values as well as economic return and community stability.

The majority of these environmental concerns, comments and recommendations relate to harvesting operations and should be considered by licensees and BCFS when developing and approving operational plans. However, to the extent that it is possible within in the scope of this determination, I will also discuss these environmental concerns in my 'Reasons for Decision'.

- public comments

Public comments were invited on the proposed temporary AAC uplift through a public discussion paper released in March 2002. Copies of the discussion paper were made available in each of the BCFS offices located within the Prince George TSA and mailed to major stakeholders, First Nation bands located in or expressing an area of interest in the Prince George TSA, and those persons who submitted comments on the previous analysis and public discussion paper. BCFS staff also provided briefings to several communities and stakeholder groups during the public review period at their request.

Owing to the urgency of the situation that precipitated this discussion, the public review period was limited to 30 days. The public comments submitted are summarized in the attached *Summary of Public Input*. A number of these comments related to the subsequent allocation of timber tenures for the proposed AAC increase. Since only the minister has the authority to apportion the AAC to the various forms of tenure that can be issued under the *Forest Act*, I will not comment on this matter further in this document. A number of comments were also submitted with respect to community stability, milling and market implications, which I will discuss in my 'Reasons for Decision'. With respect to the other comments received, I have reviewed and considered them in making this determination, and, excepting those specifically referenced in *environmental concerns*, will not comment on them further.

Reasons for Decision

In making my determination of a new AAC for the Prince George TSA, while the implications of the current beetle infestation have formed a significant part of my considerations, I have considered all those factors required to be considered under Section 8 of the *Forest Act* (attached as Appendix 1). In these considerations I have been assisted by a number of timber supply projections for the TSA. Those that have been of primary assistance to me are described and discussed under Epidemic mountain pine beetle infestation. In deciding among the alternative timber supply forecast projections, in the Epidemic mountain pine beetle infestation, I have given my reasons for accepting the revised base case as a suitable reference on which to base my considerations for this determination.

My considerations in determinations under Section 8 typically serve either to (i) verify the assumptions incorporated in the timber supply analysis and thus the reference forecasts of the timber supply based on these assumptions, or (ii) to identify particular factors which, considered separately, indicate that the timber supply may actually be either greater or less than that projected in the reference forecasts.

For the Prince George TSA, from my detailed review of the comprehensive information presented to me at, and subsequent to, the AAC determination meetings for the Prince George TSA, held in Prince George on January 28, 29 and 30, 2002 and April 30, 2002, from my discussions based on that information with staff of the BCFS, MSRM and MWLAP, and from my consideration of the summarized public input relevant to this determination submitted through the timber supply review process, I have found the following.

A number of the factors considered were incorporated and represented in the timber supply analyses by data and assumptions that accurately or adequately represent current land use and forest management practices. Those factors which I consider to have been adequately reflected in the original and revised timber supply analyses are identified as such in the preceding sections.

The remaining factors, discussed below, are those that I have concluded to under- or overestimate the timber supply as forecast by the revised base case. As in most AAC determinations, some of these factors can be quantified and their impacts assessed with reliability, while others may influence the timber supply by introducing an element of risk or uncertainty to the decision, but cannot be quantified reliably at the time of determination. These latter factors are necessarily accounted for in determinations in more general terms.

A factor that indicates the timber supply projected in the revised base case may be underestimated, to a degree that can be quantified with some certainty, is:

1) *deciduous-leading stands* — I accept that the volume contribution to timber supply of deciduous-leading stands in the THLB has been underestimated, and that an additional 160 000 cubic metres per year could be attained from the stands.

In addition to the factor listed above, other factors that lead to an underestimation of the timber supply in the revised base case projection, but to a degree that cannot be well quantified, are:

1) *site productivity estimates* — Based on results from the provincial OGSI studies and sensitivity analyses, I conclude the timber supply may be underestimated by up to 13 percent in the short-term, and up to 16.5 percent in the long-term compared to the revised base case projection;
2) *managed stand yield estimates* — The use of natural stand yield tables for estimating volumes of managed stands older than 10 years, represents an unquantified underestimation of the long-term timber supply;
3) *Crown land plans* — The deletion of 50 216 hectares of areas identified under Crown land plans represents an underestimation of the THLB. However since some of these areas will not be harvested, the effect on timber supply will likely be proportionally smaller than might be implied by the total area excluded in the analysis.

A factor that indicates timber supply projected in the revised base case may overestimate actual timber supply, but to a degree that cannot be well quantified, is as follows:

1) *caribou* — I am satisfied that it is appropriate to account for the requirements arising out of a caribou habitat management strategy in the Vanderhoof Forest District and the LRMP for the Fort St. James Forest District. Timber supply in the short- and long-term has been overestimated by 0.9 percent and 1.1 percent, respectively, on these accounts, with a combined potential impact of up to 2 percent.

I have considered the factors listed above and have evaluated them on the basis of which portion of the forecast period they affect (the short- or long-term). In consideration of the factors affecting the short-term timber supply — with the exception of deciduous-leading stands — I am satisfied there exists a net upward pressure on the projected timber supply, primarily owing to new site productivity estimates. This upward pressure of the timber supply may provide a buffer against risks associated with increasing harvest levels in the short-term. As such, I will make no specific adjustments for these factors in this determination.

In consideration of the long-term factors affecting timber supply, I am satisfied there is also a net upward pressure on the long-term timber supply. Higher long-term timber supply may provide some optimism for future generations and lessen potential future adjustments. However, since the long-term harvest levels do not effect short-term timber supply, I will not make any specific adjustments to the timber supply in this determination on the account of this positive long-term upward pressure.

Sensitivity analyses, as noted in the Alternative rates of harvest and Epidemic mountain pine beetle infestation, also indicate the timber supply of the Prince George TSA is relatively robust to short-term downward pressures. As such it can absorb some of the uncertainties and risks associated with the short-and long-term timber supply.

In consideration of the increased interest in deciduous timber, I believe it is timely to recognize an opportunity to utilize and actively manage this resource. I am also confident that biodiversity and riparian values can be maintained while doing so. I will therefore establish a new partition of 160 000 cubic metres per year for deciduous-leading stands. This partition consists of approximately 145 000 cubic metres of aspen and 15 000 cubic metres of birch. Distribution and allocation of this resource however will be left to the discretion of the minister and the regional manager. I believe this partition represents a conservative estimate of the deciduous volume potentially available. If this partition is fully utilized over the term of this determination, future increases may be possible with additional and refined analysis conducted in the context of other factors occurring in the TSA.

I am concerned with the under-utilization of the timber in Supply Block A relative to its contribution to the TSA's timber supply. I will therefore establish a partition of 400 000 cubic metres per year for this area. Future considerations for this partition and its AAC may be conditional on licensees' performance during the effective term of this determination. If the AAC of this partition is not adequately utilized I will give consideration to reducing or eliminating the contribution of Supply Block A to the TSA's timber supply in the next determination.

I agree with the assumptions used in the analysis that reduce the harvest level of looper damaged cedar and hemlock stands to 110 000 cubic metres per year. The revised analysis accounted for a retention of 20 percent of harvested areas in wildlife tree patches and for recent changes in regeneration strategies. If harvest recovery from these stands has been overestimated I recognize the timber supply could be overestimated. However, since a sensitivity analysis indicated that a reduction to the timber supply would not occur for at least 40 years, I will make no adjustment to the short-term timber supply forecast on this account at this time. I am also mindful of the numerous concerns expressed about operating in these unique stands, and economic pressures that are shifting harvest activities into the cedar-leading stands. In consideration of all the information presented to me by staff and the public, I have decided to retain the cedar-hemlock partition at the reduced harvest rate of 110 000 cubic metres per year for the term of this determination. Harvesting in this partition should continue to be focused on looper damaged stands. I acknowledge that the regional manager will exercise the necessary management flexibility required to administer current licence commitments within this partition. I expect that non-timber values in these stands will continue to be protected through current management practices, the establishment of OGMAs, and through consideration of the values in the significant areas excluded from contributing to the projected harvest. Decisions regarding this partition in subsequent determinations will be subject to future economic viability of these stands, evolution of forest management practices, and clarification of conservation objectives in the ICH.

With respect to the MPB epidemic, I have noted with great concern its implications to the health and productivity of forests in the TSA, the projected timber supply of the TSA and the mature pine inventory of the Vanderhoof Forest District in particular. If the infested timber is not harvested it will deteriorate and become unsuitable for use in lumber manufacturing. There is also a danger the dead and dying trees will become susceptible to fire, which in turn will not only endanger adjacent stands of marketable timber, but also recreation, range and residential areas. The MPB epidemic will also impact a variety of other forest resource values including recreation, biodiversity, visual landscape, cultural heritage, range, fish and wildlife, and water. The harvesting of infested timber and the utilization of a variety of silviculture systems and treatments can minimize these effects and promptly return infested areas to productive forestland.

Based on the projected conservative rate of spread of the MPB, the timber supply for the TSA could be reduced by as much as 200 000 cubic metres per year in 35 years. If the MPB expands at rate greater than projected, timber losses could be even greater. Regardless of the rate of expansion or level of intervention, the inventory of mature pine in Vanderhoof Forest District will be significantly reduced in the next 5 to 10 years. The harvest of infested timber in this area would however serve to control the spread of the MPB, salvage damaged timber and provide for the rejuvenation of infested stands thereby improving the long-term timber supply. A temporary AAC increase of 1 to 2 million cubic metres per year would not appear to be sufficient to arrest the rate of spread of the MPB. A temporary AAC uplift of 3 million cubic metres per year for five years would however appear to be able to do so. In consideration of the sensitivity analyses, which incorporated OGSI adjustments, I also believe the timber supply of the TSA is robust enough to absorb such an increase.

I will therefore establish a temporary partition of 3 million cubic metres for five years as part of the strategy to control the MPB. The majority of this partition volume should be directed to the Vanderhoof Forest District to mitigate the MPB timber supply implications and provide for a more stable future timber supply in this area. However, subject to the minister's apportionment of this uplift, I will leave the discretion for allocating this partition volume between districts to the regional manager.

The primary objective of this temporary partition is to control the rate of spread of the MPB long enough for a severe winter to reduce the its population to endemic levels. Harvesting under this partition should be directed to MPB-attacked stands along the leading edge of the infestation or in areas of new infestations. I expect that majority of this harvest will also be used to meet the MPB strategy targets and measures adopted by the forest districts. These requirements are critical to ensuring this uplift is used to slow the rate of spread of the MPB and to salvage MPB-attacked timber.

Notwithstanding, I recognize that incidental harvest of non-infested trees will be required to access and harvest the infested timber in a safe and operationally feasible manner. The harvest of non-infested trees should also be kept to a minimum to ensure that environmental values are not unduly compromised or put at risk. I trust that district managers will give due consideration to these matters when reviewing and approving forest development plans and cutting authorities for all licences issued for this partition. Management strategies must also be designed and applied in a way that protects the ecological integrity of the area.

Given the catastrophic nature of this epidemic, the highest probability of a favourable outcome is assured by directing the total TSA harvest to as much green-attack as can be logistically attained. I say this while being mindful of the CFS study which reports that 80 percent of the beetle brood must be eliminated to suppress the population. I therefore expect that the majority of volume already committed to licenses and allocated to the SBFEP also be directed at controlling and salvaging MPB-attacked trees.

I recognize there are a number of uncertainties associated with this decision. Success in using an AAC uplift to control the MPB is conditional on a number of factors — including the successful issuance of new tenures, suitable market access and prices, availability of adequate milling capacity, and proposed changes to the stumpage and tenure systems — all of which cannot be guaranteed. There are also a number of uncertainties associated with the projected timber supply forecasts including the expansion of the MPB population, the regeneration delay of harvested and unharvested infested stands, the length of time MPB-attacked trees will remain merchantable, and the growth projections for managed stands in the Prince George TSA. Subsequently, if during the term of this temporary AAC uplift new information becomes available and challenges the assumptions used in this determination, I will be prepared to revisit this decision.

In accordance with the *Forest Act*, the volume and area associated with woodlot licences issued since the previous AAC determination do not contribute to the timber supply supporting this decision.

Determination

I have considered and reviewed all the factors as documented above, including the risks and uncertainties associated with the information provided. It is my determination that a harvest level that accommodates objectives for all forest resources during the next five years, that reflects current management practices as well as the socio-economic objectives of the Crown, can be best achieved in the Prince George TSA by establishing an AAC of 12 244 000 cubic metres. This AAC includes partitions of 110 000 cubic metres for cedar-hemlock stands, 160 000 cubic metres for deciduous-leading stands, and 400 000 cubic metres for Supply Block A. It also includes a temporary partition of 3 000 000 cubic metres for controlling the epidemic mountain pine beetle infestation.

If additional significant new information is made available to me, or major changes occur in the management assumptions upon which I have predicated this decision, then I am prepared to revisit this determination sooner than the five years required by legislation.

Implementation

In the period following this decision and leading to the subsequent determination, I encourage BCFS staff to undertake the tasks and studies noted below and those I have also mentioned in the appropriate sections of this rationale document. I recognize that the ability to undertake these projects depends on availability of staff, resources, time and funding. These projects, however, are important to help reduce the risk and uncertainty associated with key factors that affect the timber supply in the Prince George TSA. I recommend that following be undertaken prior to the next determination:

- Examine the differences in environmentally sensitive area (ESA) percent reductions between districts;
- Assess the use of GIS, or other means to reduce the uncertainty of road, landing and trail reductions;
- Monitor harvest performance in deciduous-leading stands, Supply Block A and the ICH biogeoclimatic zone;
- Complete land-use objectives for the ICH to ensure that rare biogeoclimatic site series are identified and protected in Old-Growth Management Areas;
- Collect data from stands within the TSA to provide better certainty around the magnitude of site productivity adjustments;

- Monitor silviculture practices to improve the assumptions concerning silviculture systems, regeneration delay, stocking standards and the rehabilitation of not-satisfactorily restocked areas;
- Assess growth and yield impacts of managing stands to minimum stocking standards and not reforesting smaller openings created to salvage damaged timber;
- Monitor visual design practices to confirm the appropriate levels of visual disturbance to be used in the next timber supply review;
- Improve riparian area estimates;
- Establish wildlife habitat areas and implement general wildlife measures; and
- Monitor the MPB population, the efficacy rate of harvesting green-attack trees and the impact of containment and salvage harvesting on the environment.

Larry Pedersen
Chief Forester

May 29, 2002

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, reads as follows:

Allowable annual cut

8. (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for

(a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest areas and woodlot licence areas, and

(b) each tree farm licence area.

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or

(b) amends or enters into a tree farm licence to accomplish the result set out under section 39 (1) (a) to (d),

the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area

(c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and

(d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.

(3) If

(a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and

(b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).

(5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to

(a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area, and

(b) different types of timber and terrain in different parts of private land within a tree farm licence area.

(c) [Repealed 1999-10-1.]

(6) The regional manager or district manager must determine an allowable annual cut for each woodlot licence area, according to the licence.

(7) The regional manager or the regional manager's designate must determine a rate of timber harvesting for each community forest agreement area, in accordance with

(a) the community forest agreement, and

(b) any directions of the chief forester.

(8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

(iii) silvicultural treatments to be applied to the area,

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

- - - - - -

Appendix 2: Section 4 of the *Ministry of Forests Act*

Section 4 of the *Ministry of Forests Act* (consolidated 1988) reads as follows:

Purposes and functions of ministry

4. The purposes and functions of the ministry are, under the direction of the minister, to

(a) encourage maximum productivity of the forest and range resources in British Columbia;

(b) manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;

(c) plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the government and with the private sector;

(d) encourage a vigorous, efficient and world competitive timber processing industry in British Columbia; and

(e) assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

Appendix 3: Extract from Unger, L. 1993. Mountain Pine Beetle. Forestry Canada, Forest Insect and Disease Survey, Forest Pest Leaflet No. 76, 7p

Introduction

The mountain pine beetle, *Dendroctonus ponderosa,* a native pest, is the most serious insect enemy of mature pines in western Canada. In British Columbia, major outbreaks occurred in all areas with a significant pine component, except for the northern quarter of the province. Since the first recorded infestations in 1913, in the Okanagan and Merritt areas, major infestations have occurred in Kootenay National Park and the Chilcotin Plateau in the 1930s, on Vancouver Island during the 1940-50s, near Takla and Babine lakes in the 1950s, and through much of the southern interior, Chilcotin Plateau and the Skeena and Nass river areas in the late 1970s and 1980s. Well over 500 million trees were killed by the mountain pine beetle during the past 80 years.

Outbreaks generally last 8-10 years and severely deplete the pine component of forest stands; trees with a diameter greater than 25 cm are particularly susceptible. Extensive mountain pine beetle infestations hasten forest succession, change the age and diameter distribution of the pine components of the forest, and reduce aesthetic values. Infestations can also cause marketing and operational problems and environmental concerns when large volumes of dead pine are harvested either for control or salvage purposes.

Large reserves of mature pine forest are always at risk in areas climatically favorable for the beetle. Good access to susceptible forests is needed so that preventative measures can be taken and so that infested stands can be quickly treated.

Hosts

The mountain pine beetle is distributed throughout British Columbia north to 56ø latitude. Infestations have been recorded from sea level to the highest elevations where the host species grow. Native hosts include lodgepole pine (Pinus contorta), ponderosa pine (*Pinus ponderosae*), whitebark pine (Pinus albicaulis), and limber pine (Pinus flexilis). Some exotic pines may also be attacked. Occasionally non-host trees such as Engelmann spruce (Picea engelmannil) are attacked, but beetle populations do not persist in these occasional hosts.

Description and Life History

Adults are cylindrical, 3.7 to 7.5 mm long; teneral adults are light creamy-tan in color, changing to black when mature.

Eggs are pearly white, about 1 mm in size, and are laid singly in niches on both sides of the parent gallery.

Larvae are white legless grubs with red-brown heads, about 5 mm long in the fourth (final) instar.

Pupae are white at first, changing to light brown, about 5 mm long, with the external characteristics of the adult beetle visible.

The life cycle of the mountain pine beetle varies considerably. The normal cycle takes one year to complete; however, during warmer than average summers, parent adults may re-emerge and establish a second brood in the same year. Conversely, in cooler summers or at higher elevations, broods may require two years to mature. These variations in the life cycle may result in rapid increases in population levels, or conversely, sharp population decreases.

Beetle flights normally occur throughout July and into August, and generally peak in late July. Upon locating a suitable host, females bore through the bark to the phloem and cambium region, and start construction of the egg gallery, usually on the lower 5 m of the bole. The first females that attack a tree emit an aggregating pheromone which attracts mainly males. The males in turn emit pheromones attracting additional females. This leads to a mass attack which overcomes the tree's resistance. The egg galleries are usually about 30 cm long but occasionally they may reach 90 cm. They extend upward parallel to the grain and usually score both bark and sapwood. Eggs are laid in individual niches 0.5 cm apart along both sides of the gallery, and are tightly packed with frass. Eggs generally hatch in 10-14 days. Larvae feed on the phloem in individual mines extending, under uncrowded conditions, about 13 cm at right angles to the egg gallery. Broods overwinter mainly as larvae. Larval development is completed in early summer of the following year. When larvae mature, they excavate an oval chamber in which they turn into pupae. Following a short pupation period, pupae become adults. Newly formed adults, called teneral adults, spend a brief period feeding under the bark before the mature adults emerge by boring through the bark and fly to living trees to commence another cycle.

Fungi, yeasts, bacteria and other microorganisms associated with the beetle are carried by them into the tree. Some of these microorganisms are pathogenic to the tree or the bark beetle, while others are beneficial to the beetle. Fungi, which are commonly introduced by the beetle and produce blue stain in the sapwood, commence growth in the phloem and xylem soon after the beetles start their galleries. As the fungi become established they interrupt the flow of water to the crown and reduce the tree's pitch flow, which is its main defense mechanism against beetle attack. Successfully established bluestain fungi will also retain moisture in the sapwood and prevent excessive dehydration of the phloem, which is essential for brood survival. The combined action of the beetle and fungi kills the tree. Teneral adults need to feed on fungal fruiting bodies to mature, and specialized mouth parts of the beetle ensure that emerging beetles carry fungi to living trees.

Damage and Detection

Infested trees can be detected through crown and external symptoms, but the mountain pine beetle can only be positively identified (and the success of an attack can only be positively determined) by looking under the bark.

External evidence of beetle infestation on the bole usually consists of (i) pitch tubes on the stem where beetles have entered the tree, and (ii) boring dust at the base of the tree.

The color of the pitch tube often indicates the success or failure of the beetle attack. Scattered pitch tubes that are whitish in color indicate that the tree has repelled or killed the beetle by pitch exudation. In contrast, numerous reddish brown pitch tubes usually indicate that the attack has succeeded. However, pitch tubes remain pliable for several years, so soft pitch tubes do not necessarily mean that a tree is currently under attack. Pitch exudation may not occur during periods of drought or when trees are stressed due to root rot or other reasons. However, trees that have been recently and successfully infested will have dry boring dust in bark crevices and at the base of the tree. The boring dust is produced only during the initial stage of gallery construction and, depending on weather conditions, it may rapidly become inconspicuous. Woodpecker activity will often be greatly increased in infested areas, and woodpeckers will leave numerous pecking holes and may remove sections of the bark.

Characteristic symptoms under the bark include a vertical parent gallery with a slight J-like hook at the bottom and evenly spaced larval galleries extending at right angles from the parent gallery. Galleries are tightly packed with sawdust. The phloem will be dried out and brownish, and the sapwood will usually be stained a bluish color due to the fungi associated with the beetle.

Tree foliage begins to dry out as soon as the conduction of water up the tree is interrupted. As a result, the color of the foliage on infested trees gradually changes from bright to dull green. This early symptom in the lower crown will often become visible 2-3 months after attack. However, more distinct color changes occur during the onset of the growing season the spring following attack. Most lodgepole pine change from yellowish green to an orangey red by July and rusty brown by late summer. At this time most of the beetles will have left the tree. Other tree species display varying color patterns: ponderosa pine seldom turns red but develops more of a straw color, while white pine tends to become bright red. With time, retained foliage color becomes more dull, and most of the foliage drops in 2-3 years; this will vary from species to species and with weather conditions. These rapid and distinct color changes are used to schedule aerial mapping of recently attacked trees.

Beetles Associated with Mountain Pine Beetle

A number of secondary beetles are associated with mountain pine beetle and at times these secondary beetles make diagnosis of the causal agent of tree mortality difficult. Secondary bark beetles generally do not successfully establish in healthy, vigorous trees.

Several engraver beetles (Ips pini, I. latidens and I. mexicanus) attack fresh windfelled trees, logging residue, and uninfested portions of the boles of trees killed by mountain pine beetle, as well as trees of low vigor caused by root rots, stem diseases, defoliation, etc. Occasionally, however, they may become destructive in apparently healthy trees, but infestations are usually short. Since a portion of the population overwinters in the duff, extreme cold winter temperatures, which can devastate mountain pine beetle population, are much less destructive to the Ips beetles. As a result, these engraver beetles, which increased along with the mountain pine beetle population, may continue at epidemic numbers for 1 or 2 years.

Ambrosia beetles (Trypodendron spp. and Gnathotrichus sp.) are wood or pinhole borers that infest recently killed trees, fresh slash, and downed material. Infestation by these beetles can be recognized by the small piles of white boring dust surrounding the points of entry into the wood or around the lower portion of the stem.

The red turpentine beetle (Dendroctonus valens) bores under bark near the root crown and produces large reddish brown pitch tubes around the base of the bole. This is the largest of the Dendroctonus species: larvae are up to 12 mm long, and the reddish colored adults generally are between 5 and 9 mm.

The lodgepole pine beetle (Dendroctonus murrayanae) attacks the lower metre of the stem forming an irregular vertical gallery with eggs laid in groups of 20-50 along both sides of the gallery. Larvae feed gregariously. Larvae and the reddish brown adults are only slightly smaller than the same stages of the mountain pine beetle.

Sour sap bark beetles (Hylurgops and Hylastes spp.) usually attack the stem near and below duff level. Adults are black or reddish, but tend to be shorter (3-6 mm) and more slender than mountain pine beetle.

Management

Prevention

The first step in prevention of mountain pine beetle outbreaks is to prioritize stands for preventive maintenance. To this end, risk and susceptibility rating systems have been developed combining the stand parametres associated with beetle infestations and the beetle pressure on a stand. Susceptibility increases in stands (i) with trees over 60 years of age (moderate susceptibility) and with trees over 80 years of age (high susceptibility), (ii) with trees over 25 cm in diameter, (iii) with a high pine component, (iv) with a density between 750 and 1500 trees/ha, and (v) at lower altitudes and latitudes. The risk of an infestation developing within a stand is based on its distance to the nearest infestation and its level of current attack. For example, stands within 3 km of an active infestation and with more than 100 trees already attacked would be considered at risk. Risk factors can change dramatically within a year, while stand susceptibility changes gradually over a number of years.

Silvicultural treatments which help to reduce stand susceptibility include (i) reducing stand density to below 500 trees/ha, (ii) establishing an age and tree size mosaic within a stand or drainage, (iii) implementing a shorter rotation period, and (iv) establishing a species mix within a stand. The effectiveness of these measures may be reduced considerably in the presence of high beetle pressure, however.

Aerial surveillance,especially of moderate to high risk stands, will detect the initial phases of beetle invasion and allow for the early implementation of effective control measures.

Ground surveys should be conducted when pockets of discolored trees first appear in a stand to verify the causal agent and the status of the brood.

Applied Control

A variety of applied controls can be utilized, depending upon the extent of the beetle problem. In conjunction with controls, synthetic aggregating pheromones can be used effectively to concentrate beetle attack. This greatly improves the efficiency in locating newly attacked trees for follow-up treatment actions, or for containing most of an attack within a given harvesting area. Under specific conditions, mass trapping of beetles may prevent small local beetle populations from increasing or it may even reduce these populations to endemic levels. However, the effect of trapping becomes negligible when the beetle populations reach epidemic proportions.

During the initial phases of an infestation when only small infestation pockets are present, individual trees containing beetle brood can be treated by felling and burning, applying an appropriate silvicide to infested trees within 24 days of attack, application of a registered insecticide to the bole of infested trees just prior to beetle emergence, and the use of pheromone-baited, lethal (insecticide-treated) trap trees. Permits are required for such work in B.C. forests.

At intermediate infestation levels (up to about 100 trees per patch), small-patch logging can be used if good access is in place, and if beetle attack is concentrated naturally or through the use of pheromone baits. Beyond the intermediate stage, and when infestations exceed 10 ha, control becomes increasingly more difficult. In larger infestations the rate and range of beetle dispersion increases and any effective control program will require very extensive ground surveys to locate the green, newly attacked trees. Consequently, the only practical control measure at this stage is clearcutting well beyond the areas having red trees in order to remove trees containing beetles.

Natural Control

Resin flow and predation and parasitism are relatively ineffective in large infestations, but can be important in maintaining populations at endemic levels.

Resin flow is the tree's active defense mechanism against beetle invasion. It is effective in flushing out beetles (pitchout) or destroying eggs only when attack density is low, or when a high attack level is spread over a number of days. During periods of tree stress, such as drought, resin flow may be greatly reduced.

Predation and parasitism play a significant role in beetle population dynamics. Woodpeckers are the most conspicuous predators as they remove bark in search of beetle brood, in the process of bark removal they also reduce the survival rate of the remaining insects due to desiccation. Perching birds also consume large quantities of flying beetles. Some of the more commonly encountered insect predators include the clerid (checkered) beetles, and Diptera (various true fly species). Several species of wasps occasionally kill large numbers of mountain pine beetles.

Temperature can be an important factor in determining population levels during the course of an infestation. Optimum under-the-bark temperatures for brood development are between 20° and 26°C. Cool summers may delay beetle flight and subsequently slow brood development, which can affect overwintering brood survival. Early fall temperatures of -18ø will kill brood, while even less severe temperatures will kill eggs and larvae in the first three larval instars. The most cold-hardy stage, late-instar larvae, when conditioned for cold temperatures, cannot withstand temperatures below -37°; temperatures of -27° persisting for several days will kill a large portion of the population. Once the maturing larvae have resumed feeding in the spring they again become very susceptible to freezing temperatures. Since the impact of low temperatures is moderated by tree size, bark thickness and snow insulation, the duration of the cold period and snow pack is a critical factor to beetle survival.

Intraspecific competition affects brood production. High attack densities result in a more rapid rate of phloem desiccation; consequently, fewer adults emerge per unit area of bark surface. The adults which do emerge will also have a reduced capacity for egg production. Optimum attack densities appear to be between 3 and 10 per 1000 cm^2 of lodgepole pine bark surface area, but it depends upon the thickness of phloem (food source). Food supply (phloem) is a main factor in regulating beetle populations. Beetles initially select larger diameter trees with thick phloem, in which populations can increase rapidly. As an infestation progresses and the larger diameter trees have already been killed, smaller trees with thinner phloem are attacked resulting in smaller broods. These trees will also dry out faster, leading to increased brood mortality. In general, when beetles attack trees under 25 cm in diameter, the number of progeny emerging will progressively become less with decreasing diameter.

Documents attached:

Appendix 4: Minister of Forests' letter of July 28, 1994

File: 10100-01

JUL 2 8 1994

John Cuthbert
Chief Forester
Ministry of Forests
595 Pandora Avenue
Victoria, British Columbia
V8W 3E7

Dear John Cuthbert:

Re: **Economic and Social Objectives of the Crown**

The *Forest Act* gives you the clear responsibility for determining Allowable Annual Cuts, decisions with far-reaching implications for the province's economy. The *Forest Act* provides that you consider the social and economic objectives of the Crown, as expressed by me, in making these determinations. The purpose of this letter is to provide this information to you.

The social and economic objectives expressed below should be considered in conjunction with environmental considerations as reflected in the Forest Practices Code, which requires recognition and better protection of non-timber values such as biodiversity, wildlife and water quality.

The government's general social and economic objectives for the forest sector are made clear in the goals of the Forest Renewal Program. In relation to the Allowable Annual Cut determinations you must make, I would emphasize the particular importance the government attaches to the continued availability of good forest jobs and to the long-term stability of communities that rely on forests.

Through the Forest Renewal Plan, the government is taking the steps necessary to facilitate the transition to more value-based management in the forest and the forest sector. We feel that adjustment costs should be minimized wherever possible, and to this end, any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability.

.../2

Province of
British Columbia

Minister of
Forests

Parliament Buildings
Victoria, British Columbia
V8V 1X4

In addition to the provincial perspective, you should also consider important local social and economic objectives that may be derived from the public input on the Timber Supply Review discussion papers where these are consistent with the government's broader objectives.

Finally, I would note that improving economic conditions may make it possible to harvest timber which has typically not been used in the past. For example, use of wood from commercial thinnings and previously uneconomic areas may assist in maintaining harvests without violating forest practices constraints. I urge you to consider all available vehicles, such as partitioned cuts, which could provide the forest industry with the opportunity and incentive to demonstrate their ability to utilize such timber resources.

Yours truly,

Andrew Petter
Minister

Appendix 5: Minister of Forests' memo of February 26, 1996

Province of
British Columbia
OFFICE OF THE
MINISTER

Ministry of
Forests

MEMORANDUM

File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

Re: The Crown's Economic And Social Objectives Regarding Visual Resources

Further to my letter of July 29, 1994, to your predecessor, wherein I expressed the economic and social objectives of the Crown in accordance with Section 7 of the *Forest Act*, I would like to elaborate upon these objectives as they relate to visual resources.

British Columbia's scenic landscapes are a part of its heritage and a resource base underlying much of its tourism industry. They also provide timber supplies that are of significant economic and social importance to forest industry dependent communities.

Accordingly, one of the Crown's objectives is to ensure an appropriate balance within timber supply areas and tree farm licence areas between protecting visual resources and minimizing the impact of such protection measures on timber supplies.

As you know, I have directed that the policy on management of scenic landscapes should be modified in light of the beneficial effects of the Forest Practices Code. In general, the new policy should ensure that establishment and administration of visual quality objectives is less restrictive on timber harvesting. This change is possible because alternative harvesting approaches as well as overall improvement in forest practices will result in reduced detrimental impacts on visually sensitive areas. Also, I anticipate that the Forest Practices Code will lead to a greater public awareness that forest harvesting is being conducted in a responsible, environmentally sound manner, and therefore to a decreased public reaction to its visible effects on the landscape. In relation to the Allowable Annual Cuts determinations that you make, please consider the effects that the new policy will have in each Timber Supply Area and Tree Farm Licence.

.../2

In keeping with my earlier letter, I would re-emphasize the Crown's objectives to ensure community stability and minimize adjustment costs as the forest sector moves to more value-based management. I believe that the appropriate balance between timber and visual resources will be achieved if decisions are made consistent with the ministry's February 1996 report *The Forest Practices Code: Timber Supply Analysis.*

Finally, in my previous letter I had asked that local economic and social objectives be considered. Please ensure that local views on the balance between timber and visual resources are taken into account within the context of government's broader objectives.

Andrew Petter
Minister of Forests

Appendix 6: Summary of Public Input

Prince George Timber Supply Area Timber Supply Review

Summary of Public Input

BC Ministry of Forests

Prince George Forest Region
1011 Fourth Avenue
Prince George, BC V2L 3H9

Fort St. James Forest District
Box 100
Fort St. James, BC V0J 1PO

Prince George Forest District
2000 S. Ospika Blvd.
Prince George, BC V2N 4W5

Vanderhoof Forest District
Box 190
Vanderhoof, BC V0J 3A0

May, 2002

This is a summary of the public input received on the Timber Supply Review in the Prince George Timber Supply Area. This summary does not assess the feasibility or validity of the input or whether it relates to the clearly defined mandate of the chief forester in the allowable annual cut determination.

Prince George Timber Supply Area

Background

As part of the review of timber supply in the Prince George Timber Supply Area (TSA), three opportunities were provided for public input. The first followed release of the Prince George TSA *Data Package* and *Information Report* in December 1998. The *Information Report* was a non-technical summary of the draft data and management assumptions that were to be applied in reviewing the timber supply for the Prince George TSA. A 30-day review period, ending January 22, 1999, was provided for the public to comment on these documents.

On October 4, 2001, the British Columbia Forest Service released the *2001 Prince George Timber Supply Area Analysis Report* and *Public Discussion Paper*. The public was encouraged to review and comment on the accuracy of the information in these documents and to provide additional information during the 60-day review period that ended December 3, 2001.

Further to these review periods, on February 28, 2002, the chief forester announced that due to new information about the rapid spread of the mountain pine beetle (MPB) infestation, a temporary allowable annual cut (AAC) in the Prince George TSA was being proposed. Therefore, a second *Public Discussion Paper* was released to provide information about a proposed temporary AAC increase due to MPBs and the public was encouraged to provide comment during the 30-day review period that ended April 3, 2002.

This report summarizes the input received during all three public review periods. This information was provided to the chief forester for his consideration when he reviewed the AAC for the Prince George TSA. The first section of this summary outlines the public review process implemented by the Forest Service, and describes the types of public input received. The second section summarizes the public input in sufficient detail to indicate the range of input received. The original submissions (with personal identifiers removed in accordance with the *Freedom of Information and Protection of Privacy Act*) can be reviewed at the Prince George Forest Region office in Prince George.

Public Review Process and Response

Staff from the three forest districts in the TSA, as well as Prince George regional staff, actively solicited public input on the Timber Supply Review in the Prince George TSA through the following actions:

- more than 850 copies of the *Data Package*, *Information Report*, *Analysis Report* and both *Public Discussion Papers* were mailed to stakeholders in the TSA, including First Nations, licensees, local governments, environmental groups, and Land and Resource Management Plan (LRMP) participants. Meetings or presentations were offered.
- the *Data Package* and *Analysis Report* were available at the three district offices and the Prince George regional office in Prince George. About 40 copies of the *Data Package* and 60 copies of the *Analysis Report* were picked up.
- newspaper advertisements were placed advising the public of the availability of the documents for review.
- copies of all the documents were made available to the local media. Interviews were conducted with the local newspaper.
- referrals were made to the Ministry of Forests website where documents were available to download.
- in January 1999, and on November 9, 2001, meetings were held in Prince George with 30 representatives of the Prince George Timber Supply Working Group, a forest industry-based group.
- on October 29, 2001, an open house was held in the Vanderhoof Forest District office. Five members of the public,

including First Nations, attended.

- on November 8, 2001, an open house was held in the Fort St. James Forest District office. No one attended.
- on November 15, 2001, a presentation was made to members of the public interested in the cedar and hemlock harvest from the Interior Cedar-Hemlock (ICH) biogeoclimatic zone of the TSA. About 25 people attended the presentation at the Prince George Forest District office, including representatives from the University of Northern British Columbia, local naturalist clubs, residents of the ICH and government.
- on November 30, 2001, a presentation was given to the Vanderhoof LRMP Monitoring Table. Approximately 50 people attended.

The forest district and regional offices received 10 written submissions on the *Data Package*, 47 submissions on the *Analysis Report* and 38 submissions on the MPB *Public Discussion Paper* (see Appendix 1).

Public Input

In this section, public input on the information presented in the Timber Supply Review documents for the Prince George TSA is summarized under the following headings:

- Data Package (and Information Report)
- Timber Supply Area Analysis Report (and first Public Discussion Paper)
- Other comments (on the above documents)
- the MPB Public Discussion Paper

Data Package

Land Base Factors

The Fraser Headwaters Alliance (the Alliance) says the timber supply analysis should be based on the outcomes of Land and Resource Management Plans (LRMPs). The group says that including in the timber harvesting land base (THLB) any areas approved for protection distorts the amount of available timber and prolongs an unsustainable rate of harvest. An individual says it is not acceptable for a timber supply impact to prevent proposed protected areas from the Vanderhoof LRMP from being established. This submission outlines the planning process and the values of the proposed protected areas, and maintains that special management does not replace protection.

The Alliance says that due to poor market conditions and projections, they expect operability lines to move downslope, making less land available for harvesting, and this should be accounted for in the analysis. The Prince George Timber Supply Working Group (the major licensees) notes that stands considered to have an average volume too low to support the higher costs of specialized equipment were designated inoperable. They say this criterion has changed as equipment has been modified, making more areas of low volume economically operable.

Environmentally Sensitive Areas

The submission from the major licensees says that exclusions made in the past through Environmentally Sensitive Area (ESA) designations may have overlapped with other netdowns, and notes that new site specific data has been gathered since 1995 to identify areas for protection or constrained management. The major licensees recommend that ESA netdowns for sensitive soils, recreation and wildlife be dropped entirely or partially, and that any area with a sensitive designation that has had harvesting be included in the THLB.

Deciduous Forest Types

The major licensees note that deciduous-leading stands do not contribute to the THLB in the *Data Package* assumptions. They say that since the majority are aspen stands that are resilient and resist catastrophic disturbances, it is reasonable to assume they will succeed over time to conifer-leading. The major licensees recommend that 50 percent of aspen-conifer stands at age 120 years be converted to conifer-leading stands aged 80 years.

Roads, Trails and Landings
The major licensees say that the reductions in the *Data Package* for roads, trails and landings (RTLs) reflect road construction practices of the 1970s and 1980s. They say in the 1990s, roadside logging, road rehabilitation, and varying road and right-of-way widths reduced the loss to RTLs. The major licensees provide lower recommended reductions for RTLs.

Forest Inventory
Plateau Forest Products expresses concern about the use of the Prince George Forest District spruce audit, saying the results are based on inadequate sampling. The company says more diverse sampling is needed to provide statistically accurate results before this information is used in a Timber Supply Review.

Cedar-Hemlock Stands
The Alliance says significant old-growth cedar forests are being 'liquidated' in the Robson Valley for minimal economic benefit to operators, and virtually none to BC taxpayers and residents. An individual submission also expresses concern with the disappearance of cedar-hemlock forests, saying the remaining stands represent the northern extent of this ecosystem and they are extremely rich in biodiversity. This submission makes the following points:

- the rate of cut should be sustainable so future generations can also harvest old-growth cedars and firs which will only increase in value.
- these stands rarely have stand-initiating events and should never be clear cut.
- cedars affected by the hemlock looper will stand for decades and provide shelter for a regenerating forest and for old-growth dependent species.
- evidence indicates that the severity of the looper epidemic was caused by adjacent large openings, and clearcutting may set off another epidemic.

Expected Rate of Growth
The submission from BC Environment says the use of genetically improved seed is resulting in a loss of natural genetic variability in forest stands, which they see as very undesirable from an ecological and biodiversity perspective. The agency says that before improved seed is used more extensively, the implications should be seriously examined.

The major licensees say that superior stock and genetically-improved spruce seedlings are being widely used, and genetically-improved pine is forthcoming and will be used. They recommend:

- a 15 percent increase to the site index of 90 percent of current and future spruce plantations.
- a sensitivity analysis on the anticipated 10 percent increase in the site index for 90 percent of future pine plantations.

The major licensees say that site index is a reflection of an age/height relationship and since the land base is generally over-mature, the age continues to increase while height does not change significantly. They say the results of research to correct this problem, although incomplete, should be used in the timber supply analysis. Details are provided.

Regenerated Stand Volumes
The major licensees express concern about the use of a 15 percent reduction factor (operational adjustment factor, or OAF1) to estimate the area of openings within a stand. They say this overestimates the openings in stands planted under controlled conditions, and they request time to complete a survey to determine a more realistic percentage.

Regeneration Factors
The Alliance expresses concern with the regeneration delay used in the *Data Package* and questions whether several plantation failures that required replanting were accounted

for. More importantly, the group says, the uncertainty over future climate conditions means there will be difficulty predicting suitable species, time lags for natural establishment, and probably large scale plantation failures. Therefore, the Alliance says the base case should allow for a considerably longer regeneration delay and a sensitivity analysis should examine an even longer delay.

The major licensees question the logic for the not satisfactorily restocked (NSR) add–backs to the forested land base. To increase the THLB by 21,000 hectares and return previously harvested areas back to conifer-leading stands, they recommend:

- adding all previously harvested areas back into the commercial land base.
- the ministry apply for funding to locate, prepare a prescription for, and reforest to conifer-leading any area that was previously harvested and is not currently considered part of the THLB.
- adding all recently harvested areas back as conifer-leading types (not as aspen-leading, which is only a temporary condition).

Utilization Standards
Plateau Forest Products suggests that if downward pressure on timber supply is evident, a sensitivity analysis could be done to identify the benefit of reducing current utilization standards for all coniferous species (except pine in specified supply blocks) to a 15.0-centimetre diameter. The company says they understand this could increase timber supply by as much as four percent.

The Alliance expresses concern that actual volumes from mature cedar-hemlock stands are overestimated, saying it is their experience that considerably less wood is delivered to mills than is cruised on the stump.

Visual Quality
An individual submission says the analysis should pay attention to the guidelines of the Prince George LRMP regarding visual sensitivity in all mountainous areas (not just near lakes and highways).

The major licensees recommend that the analysis model the maximum allowable disturbance for each Visual Quality Objective (VQO) class, noting that better block and visual landscape design and Visual Impact Assessments are being used. The major licensees say they support the two percent buy–back on visual impacts suggested by the chief forester and therefore recommend the maximum allowable disturbance be increased by two percent in each VQO category. In addition, the major licensees recommend the use of slope to calibrate green-up heights (taller height required on steep slopes and shorter on flat areas).

Recreation and Cultural Features
The major licensees say reductions to the THLB for heritage trails may be unnecessary as cutblocks have been proposed, approved and harvested in these areas with little impact. They recommend the corridor for Heritage Trails be dropped.

Riparian Management
The major licensees express the opinion that riparian reductions have been overestimated due to stream designations being conservative, some classification being done prior to new stream guidelines, and double counting with other netdowns. They recommend further study prior to final determination of the reduction factors.

Biodiversity
The major licensees say the *Data Package* identifies an average 3.5 percent as the permanent reduction from the THLB to account for wildlife tree patches (WTPs). They recommend including all WTP areas in the THLB, but doubling them to seven percent and doubling the average rotation on them.

An individual submission says more attention must be given to understanding and protecting the integrity of forest soils and soil organisms to ensure long-term viability of both commercial timber production and the forest biodiversity that supports other values and social/commercial opportunities.

The Alliance says it is entirely unacceptable for the base case to model an old-seral minimum retention area at less than that recommended in the *Biodiversity Guidebook*, saying this appears to be a blatant attempt to circumvent the already inadequate Forest Practices Code and inflate available timber. The group says this approach means areas of low biodiversity emphasis will be treated as lower than low for 140 years, and recommends a sensitivity analysis using immediate compliance with the guidebook-recommended seral stage distributions.

Unsalvaged Losses

The Alliance says the hemlock looper event has only happened once within human memory in the Robson Valley and is the largest known mortality of hemlock due to the looper ever recorded. The group says it is erroneous to account for it as an annual event, unless the volume loss is averaged over at least 100 years.

The major licensees note that according to the *Data Package*, annual unsalvaged losses on average have increased 39 percent since the previous Timber Supply Review (TSR1), and say this is inconsistent with ongoing efforts to target and recover dead or dying stands as part of the annual harvest. The major licensees say that with increased access, younger stands, an even age class distribution, and spatial distribution of older growth, these losses should decrease in the future. They recommend:

- using loss estimates from TSR1.
- using a five-year average of salvage (not 20-year) to better represent current practice.
- reducing losses to half the initial levels when 85 percent of the THLB has been converted to managed stands.

Crown Land Plan

The major licensees note that under this plan 60,000 hectares of what was once THLB have been identified for exclusion, mainly for agricultural use. They recommend:

- arability studies to confirm/deny the suitability of the land for agriculture.
- these areas remain in the THLB until they're scheduled for development under the plan.
- a review of past removals and the return of marginal/poor agricultural land to the THLB.

Splitting the TSA

An individual submission says that LRMP processes have changed the way forest districts are managed and the time has come for each district to have its own timber supply allocation. This individual notes that Prince George forest companies want to start logging in the Vanderhoof Forest District and expresses the opinion that this will undermine the long–term stability of the industry there.

Climate Change

The Alliance provides a document on climate change and forest management impacts, and expresses the opinion that this is a critical issue deserving of consideration in the timber supply analysis. The group suggests a sensitivity analysis be undertaken to address these impacts.

First Nations

The Tl'azt'en Nation submission says that the Ministry of Forests has failed to properly consult with, let alone compensate, the Tl'azt'en Nation for the development of their territory. They note that they are at the fourth stage of treaty negotiations and have registered their objection that continued extraction of their resources is not in accordance with the honour and good faith of the Crown. The Tl'azt'en are concerned with the rate at which the timber resources in their territory are being liquidated without their consent and without any 'impact and benefit agreement' in place. They express concern that economic imperatives are the main driving force, and ecological and traditional/heritage values of their land and resources are being undermined.

The Tl'azt'en Nation say that information in the *Data Package* is incomplete or misleading, as follows:

- with respect to reliance on LRMP information, First Nations have not participated in the Fort St. James LRMP process and therefore their concerns regarding resource use and its impacts were not recorded or accounted for.
- they are in the process of completing a two-year traditional use study that has immediate and severe implications for resource use in their traditional territory (more than one-third of the Fort St. James Forest District), and none of this information has been integrated in the Timber Supply Review.

Socio-Economic Factors
An individual submission says that more consideration should be given to the recreation, commercial recreation and tourism opportunities in the TSA, particularly in high elevation areas where these opportunities increase while timber values decrease.

A submission from the District of Fort St. James expresses the opinion that previous socio-economic analyses are inaccurate and incomplete, and do not correctly depict the community of Fort St. James. This submission expresses concern with the adequacy of the socio-economic analysis to be used in this Timber Supply Review.

An individual submission says it is widely acknowledged that the remaining volume of timber cannot support the number of mills and processing facilities in the Prince George area. This submission expresses concern that if the chief forester considers the timber requirements of established and proposed facilities, this will mean continuation of the present unsustainable rate of cut to feed mills in Prince George at the expense of other areas, such as Vanderhoof.

Timber Supply Area Analysis Report

The vast majority of submissions commented specifically on factors relating to the cedar–hemlock forests of the Interior Cedar-Hemlock (ICH) zone. Other comments are summarized first in this section, followed by those relating to ICH forests.

Environmentally Sensitive Areas
The submission from the Prince George Timber Supply Working Group (the major licensees) says the use of ESAs may underestimate the size of the THLB due to double-counting; they recommend a review prior to the next Timber Supply Review to reduce or eliminate use of these classifications.

Deciduous Volumes
Ainsworth Lumber Co. expresses interest in securing deciduous volume for their 100 Mile House OSB plant and says their consultants' research on the location of the deciduous resource and merchantability indicates a long–term harvest level higher than that in the *Analysis Report*. The company says they believe their findings are operationally feasibly and economically viable.

Existing Forest Inventory
Noting the results of an audit that showed spruce volumes are overestimated, the major licensees say a more comprehensive study is needed before adjustments are made to the timber inventory.

Estimates of Future Growth
The major licensees make the following comments and recommendations:

- site productivity is more appropriately calculated using SIBEC (based on site characteristics), rather than age and height of the current stands. As a proxy for SIBEC information, Old Growth Site Index (OGSI) adjustments should be incorporated in the base case.
- the provincial average for OAF1 (to account for gaps within stands) is too high for the central interior; this should be reviewed before the next Timber Supply Review.
- current practice is that 50 percent of planted spruce seedlings come from Class A seed so the anticipated 18 percent increase in height and volume over trees grown from wild seed should be modeled.

An individual submission says any analysis regarding site productivity should consider an OGSI adjustment for subalpine fir (balsam) similar to that for spruce. An example from this individual's woodlot is provided.

Supply Block A
Five submissions comment on the future of the wood supply in Supply Block A. The major licensees say two Prince George companies are currently harvesting in this area and the volumes should continue to contribute to the AAC of the Prince George TSA. The major licensees recommend that a decision on the future of Supply Block A be deferred until the impacts of insect epidemics are known.

The Regional District of Kitimat-Stikine says the timber supply from Supply Block A should be transferred to the Prince Rupert Region as road networks develop in the west. The regional district says more timber would be economically viable if it were going to mills closer to it.

An individual submission acknowledges the sensitivity analysis that was done on Supply Block A and says if proposed road developments occur, pressure will increase to transfer the timber out of the Prince George TSA. The Carrier Sekani Tribal Council (the Tribal Council) questions the economics of harvesting in Supply Block A and says there is insufficient economic data to include this volume in the AAC at this time.

Another individual says Supply Block A should not be part of the timber supply because it would be foolish to compromise the values there to permit harvesting of low value wood. The values identified include:

- economic and social benefits from managing for wilderness-based eco-tourism and recreation.
- regionally significant plant and animal populations and habitat.
- spectacular scenery.
- large tracts of wilderness where natural ecological processes can proceed, allowing for study and improved forest management in similar areas.

Unsalvaged Losses

An individual submission says the estimates of losses to insect and disease are far too small, which is reflected in the statement in the *Analysis Report* that the current mountain pine beetle epidemic was not considered.

The Tri-Community Group (representing the communities of Fort St. James, Vanderhoof and Fraser Lake) says the estimate of unsalvaged losses in the *Analysis Report* is reasonable for a 250-year period, but in the near term losses will likely be much higher due to the mountain pine beetle (MPB) epidemic. The Group says they see the loss of mature timber through unsalvaged losses as a threat to the stability of the TSA's timber supply. The Group asks how much mature timber could be lost for sawlog utilization in the next one to two decades before the AAC is affected.

Wildlife and Biodiversity

Three submissions comment on factors relating to the protection of wildlife and biodiversity. Their comments include the following:

- concern that no consideration was given to the increase in access roads due to the beetle infestation; ATV use for hunting should be prohibited on all forest access roads.
- wildlife and ecological considerations must be given priority over economic profits, as sustainable development can only be realized with an ecologically sound land base.
- the meagre seven percent of forested land outside the THLB is inadequate to protect other values such as wildlife; many species require large tracts of undisturbed, contiguous forest.
- while landscape biodiversity may be maintained under the base case scenario, THLB biodiversity will not; details from the *Analysis Report* that support this assertion are provided.
- the original forests should be given the chance to be replaced because all stages of a forest provide wildlife habitat; the closer the habitat, the sooner small species will return to a cutblock when it acquires the appropriate attributes.

Cultural Sites

The Tribal Council says completed planning documents, such as the Archaeological Impact Assessment completed in the Vanderhoof Forest District, must be reflected in all decision-making and yet the *Analysis Report* does not refer to any land base preservation resulting from the assessment.

First Nations

The Tribal Council says that while they are engaged in treaty negotiations, they cannot support the *Analysis Report*. The Council notes the document does not address the volume confirmed to be available to them for a Community Forest Pilot Agreement, under the Forestry Bridging Agreement that has been signed. The Council also says they are opposed to timber harvesting when environmental and social impacts are not considered.

Climate Change

An individual submission says the issue of climate change (as reflected in recent beetle outbreaks and in anticipated future forest health problems) must be addressed immediately and meanwhile estimates of future wood supplies should be conservative. This submission says the current management practices modeled in the analysis are setting forests up for major health problems that will have serious impacts on future wood supplies.

Socio-Economic Factors
Four submissions comment on the socio-economic analysis. Their comments include:

- future direct employment estimates seem optimistic, considering mergers, technological advances, etc.
- the analysis of revenue impacts is deficient because it ignores reduced revenue opportunities for non-timber sectors, the effect of declining timber quality on government revenue, the associated costs of administration, infrastructure and industry grants, or the question of access to certified wood markets.
- First Nation forestry organizations and communities were not addressed in the analysis.
- what is the impact of increased harvesting of an undesirable species (balsam), with its higher harvesting and manufacturing costs, and lower revenue and stumpage.

TRC Cedar Ltd. outlines its product line and marketing strategy (primarily split rail fences and cedar mulch) which are key to its success in harvesting stands where previous operators have failed. The company says they've proven their ability to operate consistently in the ICH zone, and have created significant employment and revenue from a previously unutilized resource. TRC says these benefits must be weighed heavily against initiatives to preserve large areas of the ICH.

Regional Milling Capacity
The Tri-Community Group provides information from their analysis of milling capacity in the three forest districts contained within the Prince George TSA. They estimate the following milling capacity for MPB timber:

- under present economic conditions, 8.6 million cubic metres per year.
- under full mill production, 9.6 million cubic metres per year.
- under enhanced capacity, 11.5 million cubic metres per year.

The Group concludes that, until the present MPB epidemic is controlled, mills in the Prince George Forest District will have to process MPB timber from the Fort St. James and Vanderhoof forest districts and that additional cut will have to be transferred into these two districts. They estimate that 80 percent or more of the total AAC will be harvested in the two western forest districts. The Group expresses two concerns about this scenario:

- will the Vanderhoof and Fort St. James districts be able to support their historical harvest rates of two million cubic metres and 3.8 million cubic metres respectively, after the high rates of harvest needed to control the MPB are concluded?
- if harvest levels have to drop below the historical harvest rates after the epidemic is controlled, where will the timber come from in the TSA to support the consumption of the local sawmills?

Cedar-Hemlock Forests
Thirty-two submissions comment extensively on issues relating to the cedar-hemlock forests of the ICH zone (wet and very wet subzones) in the Robson Valley. The key points are summarized under the following topics. Some comments pertain to the base case assumptions in the *Analysis Report*, some to the revised base case presented at a public meeting on November 15, 2001, and some to presentations made at a January 28, 2002, research meeting attended by the chief forester.

Ecological Significance
Most submissions describe the old-growth ecosystems within the ICH zone as globally-significant inland rainforests that have unparalleled biodiversity and significant ecological, research, educational and tourism values. They say the timber supply analysis falls short of the harvest level reduction needed to manage and protect them. The following points are made:

- of particular concern are antique forests (where the stand is older than the oldest tree) which are generally cedar-leading. Some may not have experienced a major disturbance for thousands of years, and current climate modeling suggests the ICH zone may become wetter and therefore fire return intervals will likely increase.

- the differing characteristics between hemlock-leading stands and cedar-leading stands are not fully understood, but need to be recognized.
- over 80 percent of forests targeted by industry are cedar-leading and the *Analysis Report* recommends new tenures for the next 50 years; the net effect could be destruction of nearly 70 percent of potential antique forests.
- there is a lack of scientific knowledge about these ecosystems and great potential to discover new species and novel ecosystem functioning (e.g., ongoing study of lichens, which may be indicators of other unique community structures yet to be discovered). Until more is known, including the size and location of antique forests, the precautionary principle must be applied.
- the stands with potentially the greatest biodiversity are also the most productive from a timber perspective. These stands will occur in the THLB and will not be adequately represented outside it.
- it's questionable whether having 19 percent of the forested area older than 250 years is sufficient to represent the wealth of species developed over millennia in these ancient forests. Will these stands be in the best locations for the wildlife that use them?

First Nations Land Use

Evidence on the use of the ICH zone by First Nations is incomplete and contradictory; more research is required regarding the possibility of permanent traditional land use and settlement in this zone.

Species Conversion and Regeneration

Of the 25 submissions that comment on this issue, none express support for the conversion policy (converting cedar-hemlock stands to other species) and offer the following reasons.

- it eliminates the capacity of these forests to maintain current levels of biodiversity, and could be ecologically and economically (due to pest outbreaks) disastrous.
- forest health issues are well-documented in previous attempts to replace cedar and hemlock with other species.
- many plant and animal species will be at risk. For example, ICH forests are a seasonal home to endangered mountain caribou because the old trees provide their most basic food source (arboreal lichens).
- there are huge areas where spruce can be grown productively; the ICH is the only zone in the TSA where cedar can be grown reliably and productively. This is important for biodiversity and also to support the cedar industry.
- more information is needed to allow adaptive management processes.
- the ecological consequences must be better researched and updated guidelines on appropriate species developed.
- harvest levels based on old-growth conversion may mean TSA wood is shut out from the certified wood market.

TRC Cedar Ltd. says the base case assumptions do not reflect their regeneration practices (minimum 40 percent cedar, maximum 40 percent spruce, 20 percent Douglas-fir and pine, based on prior stand composition). The company also says they immediately plant after harvesting so their regeneration delay is less than one year, not three years as in the base case. Two submissions say the use of Douglas-fir has been given too little attention, as it grows very well on well-drained sites, and will be favoured in drier areas as climate warming proceeds.

Wood Quality

Four submissions comment on the issue of wood quality. They all express concern at the loss of old-growth wood, which is desirable and/or necessary for various value-added products such as furniture and especially musical instruments. Soundboards for string instruments can't be made from wood less than 300 years old and old-growth spruce is particularly prized, according to these submissions.

An individual recommends putting the whole ICH into a long-term rotation strategy that will provide for a sustainable harvest of high quality, old-growth timber, noting that the Robson Valley TSA has planned for some stands in the ICH to be managed on a 240-year rotation.

Forest Health

The following comments are made with regard to forest health issues in the ICH zone:

- GIS (geographic information system) mapping of hemlock looper damage must be implemented. Note that antique stands are relatively resistant to looper damage.
- the belief that harvesting old-growth forests helps maintain forest health is unsubstantiated. These forests are not generally subject to major disturbances and their health revolves around decomposition and nutrient cycling.
- the best approach to managing looper attacks may be to avoid all but the lightest logging, based on the observation that most of the serious infestations occurred downwind from major openings (which allowed warm winds to dry out adjacent stands).

Operability and Land Base

Several submissions comment on factors relating to the operable land base, as follows:

- damaged hemlock-leading stands should be excluded from the THLB, as dead hemlock deteriorates much more quickly than cedar and is almost at the point of non–merchantability.
- about 25 to 30 percent of the AAC under TRC's licence is in areas deemed inoperable by the *Analysis Report* definition. TRC blends conventional and cable harvesting to balance costs and achieve optimum utilization of a shrinking land base.
- different approaches to defining operability for hemlock- and cedar-leading stands are needed, given the condition of the hemlock market.

Post-Harvest Retention

Many submissions comment on the issue of post-harvest retention levels, as they relate to the maintenance of biodiversity in ICH forests. Key points include:

- commend the decision to increase WTP size to 20 percent of cutblock, but say most patches will not be large enough to create interior forest habitat. Edge effects are often found in patch interiors as far as two to three tree lengths.
- TRC Cedar questions the increase to 20 percent, noting the Forest Practices Code requirement of 3.5 percent and Prince George district policy of minimum 10 percent.
- 20 percent retention needs to be tested and validated. Experience in other similar types on the coast suggests that elevated levels of post-harvest retention are one of the key tools for improving biodiversity management and public acceptance.

Protection Measures for the ICH

Several submissions comment on how the forests of the ICH zone should be protected, as follows:

- old-growth cedar stands in the Driscoll and Slim Creek areas should either be protected (as protected areas or ecological reserves) or established as Old Growth Management Areas (OGMAs) or ESAs. These stands need to be protected from harvesting to serve as a storehouse of knowledge and species preservation. Only 2000 hectares of cedar-leading stands are protected in the TSA.
- the entire ICH zone in the Robson Valley has the highest value for conservation and the intact old-growth stands should be

recognized as "high conservation value forests." Antique stands should be protected through OGMAs or ecological reserves (see Fraser Headwaters Proposed Conservation Plan).

- why are areas of severe/moderate looper attack excluded from consideration as OGMAs? Understand reductions were made for OMGAs in revised base case.

Net Volume Estimates

Several submissions question the net volume harvested from cedar-hemlock forests:

- there's a discrepancy between the volume used in the analysis (400 cubic metres/hectare) and what TRC Cedar says they recover (270-290 cubic metres/hectare).
- 40 percent of stand volumes is not being used; trees would be better left standing to provide wildlife habitat, nurse logs and coarse woody debris.
- current volume-based licence is based on assumption of 400 cubic metres/hectare. This will put pressure on the land base if actual yield is lower.

Other Comments

Most submissions comment on factors or issues other than those specifically covered by Timber Supply Review documents. These comments are summarized in this section.

Timber Supply Review Process

Comments on the process include the following:

- the *Data Package* is not quantitative which makes it difficult to provide meaningful feedback. Also the time frame over the holiday season made detailed analysis difficult.
- the distinction between the "forest" and the THLB should be emphasized; all management objectives should be applied against the entire land base or the productive forest land base, not the THLB.
- the chief forester's interpretation of section 8(b) is unduly restrictive and must be broadened to address environmental, social and cultural implications of alternative rates of timber harvesting.
- Hemlock-leading stands and cedar-leading stands have different ecologies and markets and need to be analyzed separately.
- pleased with revised base case assumptions and that stand conversion is no longer the approved procedure.
- the assumption that management practices will continue unchanged is almost certainly not true and simply justifies the status quo.
- no attempt was made to model possible expansion of the value-added sector or to model wood qualities under various management regimes.
- the analysis should be based on management units (e.g., watersheds) that are consistent with the operational areas of licensees; an AAC per unit should be set.
- does the timber supply model reflect what is occurring on the ground, specifically in relation to objectives that may not be achievable given the necessity to address the MPB epidemic (e.g., biodiversity reserves, green-up, size of clearcuts)?
- harvesting priority for the next one to two decades will be in younger stands infested with MPB or spruce bark beetle; perhaps the older balsam-leading stands should be modeled to drop out of the timber supply at some point, since they may not be harvestable by the time tenure holders get to them.

Management Practices

Many submissions comment on management practices and objectives, particularly for the ICH zone. Key points include:

- there is a need to differentiate between appropriate management in hemlock–leading vs. cedar-leading stands (the latter have a longer rotation and are less affected by the hemlock looper).
- direction is needed to increase the use of cedar regeneration in both ICH silvicultural prescriptions and in measurable

reforestation outcomes, consistent with the approved Prince George LRMP.
- biodiversity should be the acknowledged objective in the ICH. Harvesting only merchantable trees, leaving 30 to 50 percent retention and minimizing understory disturbance, will create multi-story and multi-species communities that will benefit the biological community, as well as recreation and visual quality.
- all unprotected old-growth ICH stands should be managed for extended rotations, so that forest products currently available will continue to be available.
- a policy is needed requiring a survey by competent persons to assess antiqueness prior to issuance of a cutting permit in older ICH stands.

In addition, an individual recommends shortening the Forest Practices Code to 400 pages, harvesting wherever there is a bug infestation, and not worrying about tearing up the land as this allows oxygen to get at seedling roots for faster growth.

Tenures
Sixteen submissions comment on the issue of tenures in the ICH zone. The following recommendations are made:
- no further tenures be granted (in particular the outstanding 30,000 cubic metre licence), nor extensions to existing licence(s).
- tenures must be short term (rather than 50 years).
- tenures must be flexible to allow research and adaptive management processes to occur.

In addition TRC Cedar makes the following comments:
- they have successfully completed the five year licence (for 40,000 cubic metres/year) issued in 1996, and have begun harvesting under the new 15-year licence (80,000 cubic metres/year) issued in 2000.
- clear direction is needed regarding several looper-related issues under the current licence, as their planning is being restricted due to these uncertainties.
- what is the status of the 30,000 cubic metre licence? It poses concern for timber supply sustainability and affects TRC's ability to have its operations certified by the Forest Stewardship Council. The company sees certification as critically important and has been working toward it for two years.
- the 30,000 cubic metres should be used to assist in managing the beetle epidemic, be revoked for non-performance, or restricted to severe looper attack stands only.

The Tri-Community Group notes that the present AAC is still not being fully utilized to process MPB timber, based on their analysis of regional milling capacity. They therefore see no benefit in awarding new forest licences in green-attacked timber at this time, but ask the chief forester to revisit this issue if circumstances change.

Canadian Forest Products Ltd. (Canfor) says that any AAC increase as a result of MPB control efforts should be allocated to non–replaceable forest licences (maximum 10 years) that prohibit the construction of increased milling capacity.

Harvest Levels and Partitions
Ainsworth Lumber requests that a deciduous–leading partition be established.

The major licensees say they agree with the *Analysis Report* that the TSA has a robust supply of mature, merchantable growing stock and recommend consideration of an AAC increase now or in the future, especially if warranted to counter beetle epidemics. They identify several upward pressures on the base case, including the use of improved seed, the underestimation of future plantation productivity, the use of ESAs and the use of the provincial OAF1 factor. They say the downward pressure indicated by the inventory overestimate in spruce stands is unknown and minimal.

Canfor recommends that the AAC be increased by 1,000,000 cubic metres for the next 10-year period. The following reasons are offered:

- the base case forecast presents a very conservative assessment of timber growth and yield because it does not incorporate ecosystem-based site indices, genetic gains, and OGSI adjustments.
- the base case relies heavily on harvesting current mature volumes for the next 170 years; this is not optimal as damaging agents (e.g., bark beetles) and normal stand deterioration due to aging will reduce the mature volumes available over that time period.
- moving toward managed stand scenarios on an accelerated schedule will minimize future expenditures required to rehabilitate dead or damaged stands.

Canfor further recommends that the AAC increase be directed into timber stands that:

- are currently infested with bark beetles.
- contain insect-damaged timber that is still usable as sawlogs.
- are comprised of older age class stands that are vulnerable to normal stand deterioration and/or attack by damaging agents.

The Tri-Community Group expresses concern about the timber supply impacts of efforts to control the pine beetle and spruce bark beetle attacks. The Group says the shifting of AAC between forest districts and the consideration of a temporary uplift are important issues.

After examining mill capacity and related factors, the Tri-Community Group says no increase in the AAC for the MPB epidemic should be considered until it can be demonstrated that all the timber is being processed by mills in the TSA. The Group estimates there is currently a net mill capacity of 8.6 million cubic metres suitable for processing MPB wood, and only when this level is reached should an AAC increase to manage the epidemic be considered.

The Tri-Community Group also expresses concern about the utilization of dead standing timber that is part of the AAC. The Group notes that the magnitude of this volume and the actual usable life of dead standing timber are two unknowns (although current estimates for the latter are three to five years). The Group asks the chief forester for a commitment to revisit the possible partitioning of the AAC (and possibly an increase in the AAC) to encourage harvesting of the dead timber after it's no longer suitable for sawlogs.

An individual submission expresses concern about long-term timber supply and employment opportunities, and challenges the Ministry of Forests to demonstrate the cutblocks intended for harvest in the year 2171. This individual says it is not possible to calculate an AAC based on a forest inventory that has been depleted severely due to the beetle epidemic, without cutting into "capital" instead of "profit."

Twenty-one submissions comment on the AAC for cedar-hemlock forests and suggest further reductions in the AAC. Key points include:

- commend decision to reduce the AAC in the ICH but suggest further reduction because of lack of mapping of looper damage, lack of information about the extent and functioning of antique forests, and the need for further research to maintain the biodiversity in these forests.
- remove old-growth forests from harvesting; they are an investment in the future.
- why is there a 50-year cut set at 100,000 cubic metres when 85,000 cubic metres is considered sustainable? The AAC should be set at the long range sustainable yield, or even lower.
- the harvest level is justified by recovery of

looper-damaged stands, yet harvesting is aimed at cedar-leading stands. Most salvageable wood has already been harvested.
- an AAC at 100,000 cubic metres misrepresents the differences between past and present tenure sizes. For example, there are currently two 10-year tenures totaling 110,000 cubic metres/year.
- harvesting at the sustainable rate of 30,000 cubic metres/year with 30 to 50 percent retention will closely mimic natural disturbances while still remaining operationally economic.

Two submissions express support for the proposed harvest level of 110,000 cubic metres/year in the ICH zone. A consultant says this is an appropriate level at present to maintain a balance between economic opportunities and future management options that may include a greater conservation emphasis.

An individual says all logging should be discontinued in the ICH until far more is known (e.g., the impact of logging on biodiversity, wild fish stocks, weather patterns, wildlife migration, adjacent farms, Canada's role as a carbon sink).

TRC Cedar says establishing a sustainable harvest level of 50,000 cubic metres/year in the ICH will not be sufficient for their operations. The company also says maintaining 110,000 cubic metres for 30 years will mean long-term viability will be sacrificed for short-term commitments.

One submission suggests a partition of cedar and hemlock. Another suggests a separate AAC for light to moderately-damaged hemlock, and otherwise hemlock should comprise a portion of the AAC when markets are available. This submission says the sustainable level of harvest for hemlock is roughly half that of cedar.

MPB Public Discussion Paper

Operable Land Base

The Prince George Timber Supply Working Group says Supply Block A should continue to contribute volume to the AAC until the impacts of both MPB and spruce bark beetle epidemics in this TSA and adjoining ones are known.

Forest Management Strategy

Several submissions comment on the potential for an AAC increase to result in increased harvesting of non-infested trees and they say the increase must be targeted to beetle wood. The Prince George Timber Supply Working Group says all of the increase must be targeted at minimizing the spread of both MPB and spruce bark beetles, and salvaging value from beetle-attacked timber throughout the TSA. The Vanderhoof District Chamber of Commerce says a strategic plan is needed that specifies the temporary nature of the increase and directs harvesting to MPB stands only. Dunkley Lumber Ltd. says new licences should focus on control harvesting first and salvage harvesting second.

An individual submission recommends harvesting a half-kilometre-wide swath of green trees around the edge of dead trees. This individual says cutting already brown trees will do nothing to control the spread of the insect, and these trees should be left standing to provide other ecological values (nesting sites, shade, coarse woody debris, etc.). Another individual says all the wood possible should be salvaged, as it will be pulp in three years.

One submission says everything possible must be done to control this epidemic, including harvesting infected trees in park reserves, while another submission says there should be no increase in logging in parks or protected areas, except for certain small operations (e.g., salvage heli-logging).

Dunkley Lumber Ltd. expresses concern with the statement in the *Public Discussion*

Paper that the MPB and spruce beetle are being managed within current harvest levels in the Prince George and Fort St. James forest districts. The company says they are seeing huge increases as the wave of beetles travels from west to east (confirmed by the map issued by the Beetle Task Force). Dunkley Lumber recommends that the harvest increase should be directed towards the "front" of the epidemic as needed and (assuming an increase of three million cubic metres per year), at least one million cubic metres should be directed into the Prince George and Fort St. James districts.

Other comments about the forest management strategy include the following:

- the role of the Beetle Coordinator should be changed from facilitator to that of a statutory decision-maker.
- the *Public Discussion Paper* is based on "could be" and "may be" and such radical action as the proposed AAC increase should be based on something more certain. Several unknowns about impacts and future conditions are identified.
- management practices should ensure that the same problems do not occur in the next rotation (i.e., avoid single species, even–aged stands).
- be cautious with the use of MSMA pesticide treatments.
- instead of increasing the AAC, shift the harvest from northern and non-epidemic areas of the TSA to the epidemic area, or shift AAC from other districts (e.g., Slocan can cut less in Mackenzie Forest District and more in Vanderhoof, and then trade it back). "Exchange of fibre agreements" can be used to ensure long-term community stability.
- beetle management through logging only works if the objective is to increase the beetle population. The only solution now may be an aggressive burn program.
- a volume increase needs to be part of an overall beetle management strategy. Canfor provides details on such a strategy's contents and goals.
- roads should be built for the long term and access maintained for future management in an economic manner. Public safety on both local highways and arterial forest roads must be addressed.

CM Aquatec Infrared Service Ltd. proposes the use of new infrared technology that can identify where the beetles are now and where they are going. This will assist in a planned approach to the harvest, help alleviate some of the environmental concerns and provide a significant cost saving, according to the company.

Lakeland Mills says the *Public Discussion Paper* has limited discussion on the spruce bark beetle. The company says the amount of attack has been increasing rapidly during the past few years and its extent and impact should be given equal consideration to the MPB.

Environmental Implications

Old Growth Management

An individual submission suggests that, in consideration for adding millions of cubic metres to the AAC in threatened pine forests, priority be given to implementing Old Growth Management Areas in the ICH zone in the Rocky Mountain Trench.

Riparian Management

An individual asks if buffers will be left along creeks, rivers and lakes.

Fisheries and Oceans Canada (DFO) expresses concern with the protection of fish and fish habitat in the proposed management strategy, saying it must include an emphasis on ecosystem integrity and function at the watershed scale to protect fisheries and water resources. DFO notes the ecological importance of bark beetle outbreaks and says management activities should not be based on the assumption that the current outbreak is an ecological disaster in need of mitigation. DFO also affirms that the federal Fisheries Act continues to apply to forest development operations in BC.

DFO notes the following specific concerns regarding MPB management:

- changes to peak streamflows, landslide activity and surface erosion risk.
- the need to avoid the costs of watershed restoration plans.
- the application of management direction from LRMPs, which specifically address riparian and aquatic protection.
- extending the period of harvesting creates a high risk of environmental impact.
- the reliability of distinguishing red from green attack, and the removal of green timber through indiscriminate harvesting.

DFO urges application of the precautionary principle, and makes specific recommendations including:

- watershed assessments for affected watersheds.
- provision of adequate riparian reserve and management zones, including provisions beyond those of the Forest Practices Code (for small streams).
- establishment of indicator basins.
- participation by academics and community groups in the development and implementation of an effective monitoring system.

Wildlife

One individual asks how these clearcuts will affect wildlife. Another notes the impact on many species of removing the majority of mature pine but says the increase in roads will have the greatest effect on moose and deer populations. This individual recommends:

- all logging access roads in the southern part of the Vanderhoof Forest District be closed to all-terrain vehicle use for hunting until all harvested areas have been reforested.
- an annual review of the AAC.
- spruce and deciduous trees not be harvested or damaged, to soften the impact on bird species and some furbearers.

The submission from the Ministry of Water, Land and Air Protection (MWLAP) notes that impacts of large-scale salvage for insect control were identified in a report by John Stadt, the forest ecosystem specialist in the Lakes Forest District. These impacts include:

- reduced coarse woody debris, affecting species that depend on it and predators that rely on them.
- loss of habitat for woodpeckers and other cavity-nesting birds.
- loss of older habitats, which will favour some species but be detrimental to others.
- increases in peak streamflow and storm flow volumes within streams.
- increased road development (source of erosion; habitat fragmentation; altered predator-prey dynamics; improved access to hunters and poachers).

MWLAP makes several recommendations to limit the impacts of extensive salvage logging on wildlife and other resources, including:

- assign harvest priority to active infestations.
- attempt to leave non-susceptible and unattacked trees, at both the stand and landscape level.
- where possible, consider retaining stand level structural elements (e.g., wildlife tree patches).
- aggressive deactivation of new access to previously unroaded areas.
- develop a carefully planned program of harvesting that considers impacts to landscape and stand level environmental values, as well as economic return and community stability.

First Nations

An individual submission says First Nations' rights have to be protected, and in particular the good trees on their traplines and territories must be left. These areas have been passed down from generation to generation for thousands of years, accompanied by strict laws, according to this individual.

Canfor suggests a portion of the volume increase should be targeted to tenures for First Nations. A First Nations forestry consultant agrees, saying part of the increased harvest should be awarded to aboriginal forest enterprises, as this would increase stability in the aboriginal community and increase economic well-being. This submission says aboriginal businessmen can help to sell excess logs that can't be milled locally, by using aboriginal mills in the USA that need raw logs.

The Burns Lake and District Community Economic Development Association encourages the Ministry of Forests to work closely with First Nations groups to ensure they have a meaningful role in the fight against this epidemic.

Tanizul Timber Ltd. says all implications of an increase in harvesting must be considered, including recent Court decisions regarding consultation with First Nations. The company also points to the need to have a marketing strategy that creates a level playing field for all tenure holders with no subsidies. Tanizul Timber says TFL 42 has an increasing beetle problem with dwindling markets, and is paying 60 to 70 per cent of its revenue for stumpage charges.

Community Implications
A submission from two directors of the Regional District of Bulkley-Nechako maintains the movement of MPB wood in the Lakes Forest District must occur via three identified routes, in order to attain community stability in Burns Lake, Fraser Lake, Houston and other communities to the west. This submission says this approach to transportation will enable communities in the Prince George TSA to focus on the harvesting and control of MPB volumes in their districts.

The Burns Lake and District Community Economic Development Association says a state of emergency must be declared to provide financial aid to assist communities to deal with the impact of this epidemic, to streamline regulations, etc. The association also says the affected communities must be supported in preparing for the AAC drop at the end of the epidemic, in order to assure economic stability.

Economic Implications
An individual trapper says that increasing the harvest directly affects the ability of registered trappers to maintain their income from trapping, and they want to be compensated just as they are by BC Hydro and other tenure holders. This individual says all stakeholders in the forest resource, including trappers, must be considered.

Three submissions express the opinion that the proposed harvest increase may protect the timber industry but will negatively affect activities that depend on wilderness or undisturbed areas, including tourism, recreation, guide-outfitting, trapping and fishing. One submission notes that unaltered, beetle-killed stands are acceptable to backcountry tourists as part of the wilderness experience, while an abundance of managed forests are not. Two submissions note that the *Public Discussion Paper* does not even mention any other resource users.

Several submissions comment on the issue of milling capacity. The following opinions are expressed:

- the additional harvest may send some timber away from local mills for the short term, but if nothing is done, there will be little economic benefit in the future.
- existing processing facilities must be fully utilized to process timber from the increase before new facilities are awarded timber.
- adding shifts to the closest milling facility is preferable to trucking logs extra distances.
- guarantees are needed that there'll be adequate fibre to maintain current operations once the epidemic has been dealt with, including agreements on "exchange of fibre."

The Tri-Community Committee (including the mayors of Fraser Lake, Vanderhoof and Fort St. James) provides information from two recent reports they developed. The first report deals with the mill capacity available for processing MPB-killed timber and says that 8.6 million cubic metres could be dedicated to MPB timber. However, the committee notes its concern that a mid-winter evaluation of harvesting plans seemed to indicate that only about two-thirds of that potential would be used to process MPB timber in the 2001/02 logging season. A coordinated strategic action plan for the entire epidemic areas is needed, according to the committee, and details on suggested components of the plan are provided.

The Tri-Community Committee says their second report, which looked at the potential future inventory of dead standing timber, concludes that MPB population growth could be held in check with normal mill capacity levels by optimally utilizing the TSA's milling capacity. The committee notes that the Prince George District has about 60 per cent of the milling capacity suitable for MPB timber and says a temporary AAC increase that allowed those mills to continue milling green wood, while large volumes of MPB timber are put up for harvest in the Vanderhoof Forest District, would be counterproductive.

The issue of timber pricing is raised in several submissions. Canfor recommends that any volume increase in the TSA should be used to facilitate the movement to a Market Pricing System. Aspen Ridge Consulting asks if other tenure rates will be tied to the Small Business Program rate, noting that otherwise woodlots and licences to cut (such as agricultural leases) are at a disadvantage when selling their wood and these tenures will become beetle-breeding sites if this discrepancy is not rectified.

L&M Lumber says that any changes to the timber pricing system that are implemented for this increase (such as inter-TSA hauling differentials) must be reciprocal for licensees forced to harvest timber outside the district or TSA when the epidemic is over.

Market Implications

Many submissions comment on how market conditions and other related factors (such as the Softwood Lumber Agreement dispute) will affect or be affected by the proposed increase in harvest. These comments include:

- an increase in lumber exports to the USA will result in financial sanctions that will force mills to either curtail or close operations, given the softwood lumber dispute. There is no other place to sell the lumber.
- an increased AAC for the sake of volume is a poor marketing plan when there is no market. It's foolish to increase the wood supply to the marketplace without a clear and certain demand for more lumber.
- log storage options (both land and water) must be explored. Lumber can be safely stored for years.
- three submissions say raw log export regulations must be relaxed and free trade in logs allowed, while one submission expresses the opinion that the majority of the public does not support raw log exports.
- if log exports are permitted, government must ensure the Americans accept infested timber as well as healthy, non-infested trees so all the poor quality logs are not left for Canadian manufacturers.
- an AAC increase will compound the existing log market situation. Local mills are benefiting from the oversupply situation and land-based tenures (e.g., woodlots) are being squeezed out of the log market. A level playing field for all tenure holders must be established.

Harvest Levels

Almost all of the submissions comment on the proposed AAC increase.

Eight submissions express doubt about or opposition to the increase, citing the following concerns:

- the current AAC is not sustainable and increasing it is a major concern.
- consider other options, such as temporarily reducing the cut in TSAs with a lower harvesting priority, and have licensees from those TSAs move their harvest to the Prince George TSA, with the government covering the extra transportation costs.
- increasing the AAC doesn't guarantee an increased harvest, due to market factors.
- unless the rate of logging is immediately reduced, sustainable ecosystems will be further threatened and mills will close due to wood shortages.
- better utilization, more manufacturing efficiency, more trees on the open market, and directing harvesting resources to the beetle areas make an increase unnecessary.
- an increase will negatively impact economic input from activities that rely on wilderness or undisturbed areas. It's important to diversify the economy.
- the Vanderhoof LRMP working group was not comfortable with an AAC of 1.9 million cubic metres/year (as an alternative to the 1995 AAC of 1.7 million cubic metres), due to concerns about sustainability.

Sixteen submissions express support, sometimes qualified, for a temporary AAC increase. The following points are made:

- it's the only way out of a terrible situation. If drastic measures are not taken now, there'll be very few resources left for the future.
- the AAC must be increased by three million cubic metres per year, as one million cubic metres will not provide enough additional harvesting power to have an impact.
- an increase of three million cubic metres/year would exceed milling capacity, put too much pressure on other forest values, and open the door to raw log exports.
- the increase must be targeted to minimizing the spread of beetles and salvaging value from beetle-attacked stands.
- the full MPB timber milling capacity of the TSA must be used.
- prompt reforestation will ensure forest values are sustained.
- the AAC increase will increase current and future employment.
- don't overplay the extent of the disaster; a drop of only 2.3 per cent in the AAC after 35 years is projected if there's no increase for MPB harvesting now.
- the increase must not adversely affect the environment or social values identified in the TSA's three LRMPs.
- too large and/or sudden an increase could adversely affect licensees' certification efforts.
- the long-term viability of the industry is a major concern. Every effort should be made to return licensees to current harvest levels after the epidemic is controlled.
- the same percentage increase applied to the TSA should also be applied to woodlots with an existing beetle problem and a high proportion of pine trees older than 60 years.

Several submissions comment that this temporary increase must be regularly and frequently reviewed, and rolled back as soon as the epidemic is under control.

Allocation and Tenures

Dunkley Lumber Ltd. says any AAC increase must be awarded through competition structured to maximize the opportunity to participate in the resulting economic activity. For example, there should be a good distribution of licence size and location within each of the three districts, using non–replaceable forest licences and some short-term timber sales.

The submission from the Nechako Lodge questions if the Vanderhoof district will take the largest allocation and how such a massive increase will impact sustainability.

L&M Lumber recommends that meetings be held with affected stakeholders before the increase is allocated to ensure there is consensus about the planned distribution and that the increase is fully directed to the current beetle epidemic. The company notes specific concerns about their small profile pine licence, such as the fact this timber is less susceptible to infestation and could be left surrounded by large clearcuts. This would mean islands of small profile timber would not be available for harvest until green-up has been achieved around them, according to the company.

Canfor makes several recommendations regarding apportionment, including the following:

- the potential increased harvest forecasted by the Vanderhoof Innovative Forestry Practices Agreement (IFPA) should be allocated pro-rata to the IFPA participants prior to other additional volume being offered or allocated.
- only non-replaceable licences should be allocated with one to two-year terms.
- maximum flexibility should be maintained, so harvesting can be targeted to areas of highest priority.
- operating areas where increased volumes will be harvested need to be jointly agreed on by the Ministry of Forests and licensees, in order to not undermine certification and sustainable forest management efforts.
- any volume increase should be used to facilitate the move to a market pricing system.

Appendix 1 — List of submissions received by the Prince George, Vanderhoof and Fort St. James Forest Districts

Submissions received on the Data Package

First Nations
Tl'azt'en Nation

Government agencies
BC Environment

Forest industry
Plateau Forest Products Ltd.
Prince George Timber Supply Working Group

Local government
District of Fort St. James

Interest groups
Fraser Headwaters Alliance

General public
Four individual submissions

Submissions received on the Timber Supply Analysis Report

First Nations
Carrier Sekani Tribal Council

Local government
Regional District of Kitimat-Stikine
Tri-Community Group (Regional Community Economic Development Management Committee) (Dec. 5, 2001, and Jan. 18, 2002)

Forest industry
Ainsworth Lumber Co. (submitted by Timberline)
Prince George Timber Supply Working Group (major licensees)
TRC Cedar Ltd.
Canadian Forest Products Ltd.

Consultants
Enlichened Consulting
DR Estey Engineering
Silvifauna Research

Interest groups
Dome Creek Forest Information Committee (May 27 and Nov. 30, 2001)
Fraser Headwaters Alliance
Inland Rainforest Research Initiative (Dec. 3, 2001, and Feb. 22, 2002)
Lands Council
Prince George Naturalists Club
Youth Round Table on the Environment

General public
28 individual submissions

Submissions received on the MPB Public Discussion Paper

Local government
Regional District of Bulkley-Nechako
Tri-Community Committee (Regional Community Economic Development Management Committee)

Government agencies
Fisheries and Oceans Canada
Ministry of Water, Land and Air Protection

Forest industry
Canadian Forest Products Ltd.
Dunkley Lumber Ltd.
L&M Lumber Ltd.
Lakeland Mills Ltd.
Northern Forest Products Association
Prince George Timber Supply Working Group
Tanizul Timber Ltd.

Consultants
Aspen Ridge Consulting
CM Aquatcc Infrared Service Ltd.
Tsal' Ts'ul Forest Services

Interest groups
Burns Lake and District Community Economic Development Association
Vanderhoof District Chamber of Commerce

General public
22 individual submissions